NAVY YARD-BALLPARK

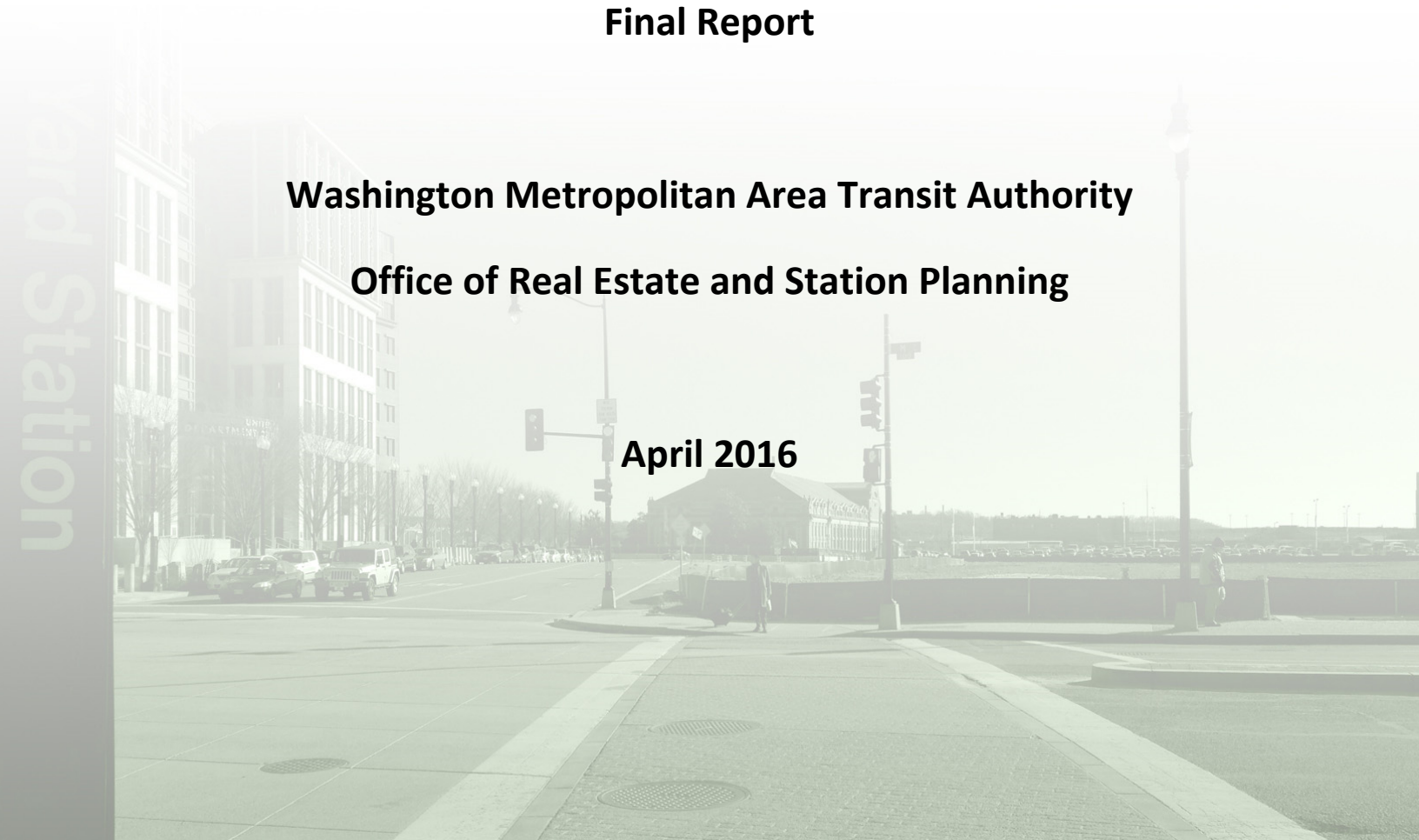
STATION ACCESS IMPROVEMENTS STUDY

Final Report

Washington Metropolitan Area Transit Authority

Office of Real Estate and Station Planning

April 2016



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Additional Volumes

Navy Yard Station Access Improvements Study Drawing Set

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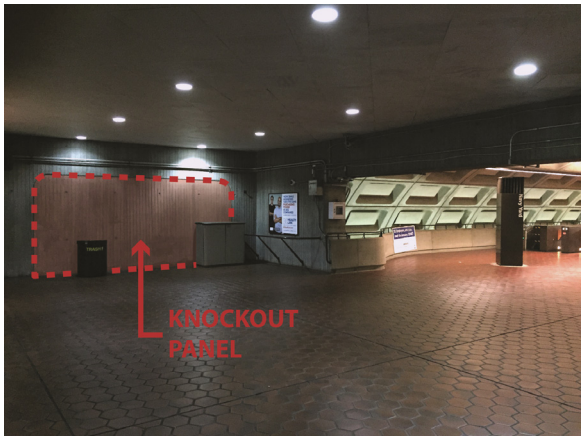
Executive Summary

Introduction

The Navy Yard-Ballpark Station Access Improvements Study ("the study") was conducted by the Washington Metropolitan Area Transit Authority (WMATA or "Metro") to conduct an analysis of the required station and access facilities for a second East Entrance at the Navy Yard-Ballpark Metrorail station ("the station"). The station is located in Southeast, Washington, DC, and served by the Metrorail Green Line. The underground station is located along M Street, SE with entrances at New Jersey Avenue, SE, and Half Street, SE, in the Capitol Riverfront neighborhood (see **Figure ES-1**). The study examined typical non-game day operations at the station and focused primarily on passenger activity at the East Mezzanine and East Entrance. As of 2014, the station had more than 10,000 passenger boardings on an average weekday. Ridership is expected to continue to increase to nearly 14,000 average daily passenger boardings by 2025 as additional phases of *The Yards* redevelopment and other nearby projects are constructed.

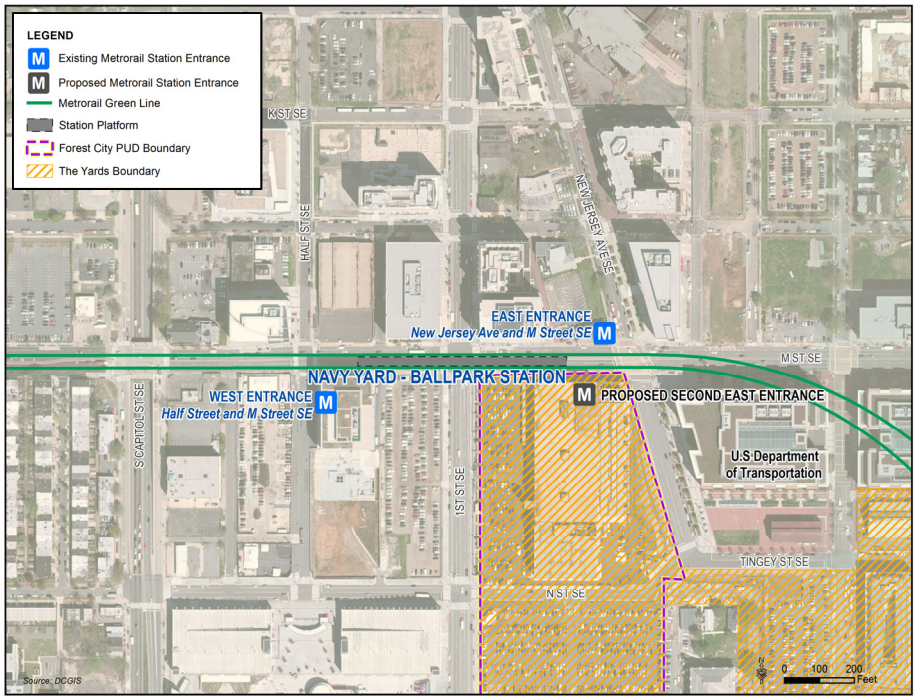
A second East Entrance was considered for the southwest corner of New Jersey Avenue, SE and M Street, SE. The entrance would take advantage of a knockout panel located on the East Mezzanine and would be located on the site of a Planned Unit Development (PUD) to be developed by Forest City as part of *The Yards* redevelopment. This study conducted an analysis of the required station and access facilities to implement the proposed second East Entrance as described above.

Site of second East Entrance with USDOT Headquarters in the background



Knockout Panel on East Mezzanine to be used for second East Entrance

Figure ES-1: Navy Yard-Ballpark Station Study Area



Existing Conditions and Passenger Movements

Most passengers were seen exiting the station via the East Entrance during the AM peak, traveling towards the U.S. Department of Transportation (USDOT) or east toward the Navy Yard. During the PM peak, most passengers were seen entering the station via the East Entrance from the direction of the USDOT or from the east towards the Navy Yard. Within the station, congestion and queuing occurred during the AM peak at the East Mezzanine faregates and along the platform (particularly near the base of the escalator leading up to the East Mezzanine). During the PM peak, there was little to no congestion or queueing at either the East Mezzanine or Platform. Additionally, there was no congestion or queuing at the West Mezzanine during non-game day operations for both the AM and PM peak.

Congestion at East Mezzanine Faregates (left) and station platform (right)

Existing (2015) and Future No Build (2025) Simulations

Methodology

Station ridership was forecasted based on 2014 faregate data and adjusted for the future year (2025), simulating station entries and exits to account for future area population and employment growth. Metrorail operations assumed trains running every 6 minutes during peak periods and every 12 minutes during off-peak periods (no change between 2015 and 2025).

Simulation Results

The Existing Conditions and No Build 2025 simulations resulted in increased congestion along the station platform (see **Figure ES-2**) and increased travel time for passengers exiting the station as well as waiting to board escalators, stairs, and elevators (see **Table ES-1**).

Figure ES-2: AM Peak Passenger Congestion within Navy Yard-Ballpark Station

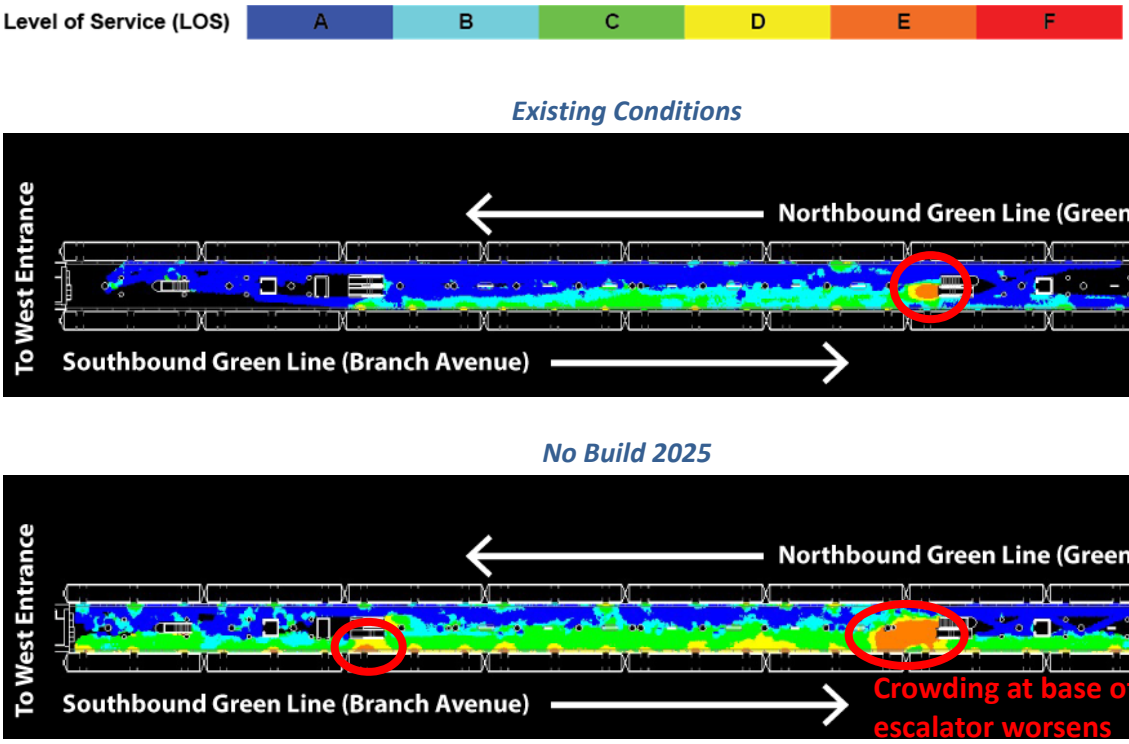


Table ES-1: Passenger Journey Time and VCE Queue Clearance Time, AM Peak 15 Minutes, Existing Conditions and No Build 2025 Simulation

	Passenger Journey Time Platform to East Entrance (Minutes:Seconds) Platform to East Entrance	Escalator Queue Clearance Time (Minutes:Seconds) Platform to East Mezzanine
Existing Conditions	2:47	1:03
No Build 2025	**3:31**	**2:41**

Design Options

Three locations for a second East Entrance and two East Mezzanine improvement options were developed based on the No Build 2025 simulation results to provide access to the street level via the existing East Mezzanine knockout panel and to address future internal station deficiencies. Coordination with local agencies and stakeholders was helpful in providing specific guidance on station accessibility and design requirements, as well as potential entrance locations and site-related concerns. **Figure ES-3** shows the street level locations of the proposed second East Entrance. **Figure ES-4** shows the potential East Mezzanine improvements.

Figure ES-3: Proposed Second East Entrance Locations (Street Level)

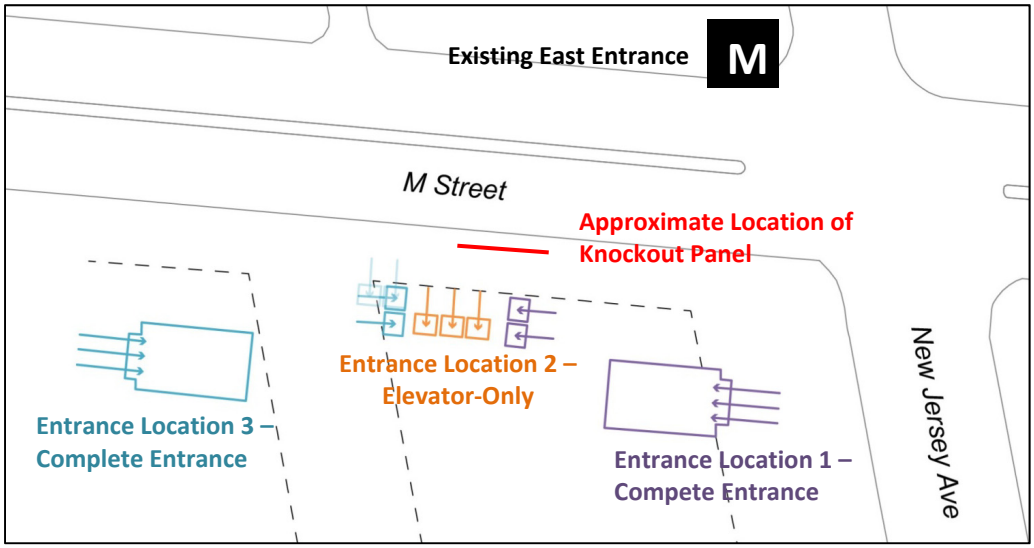
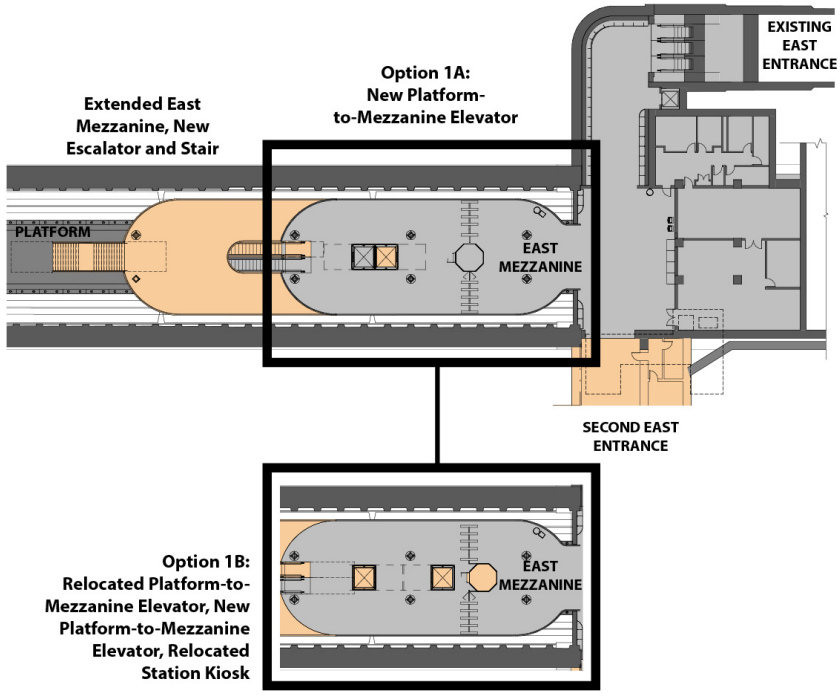


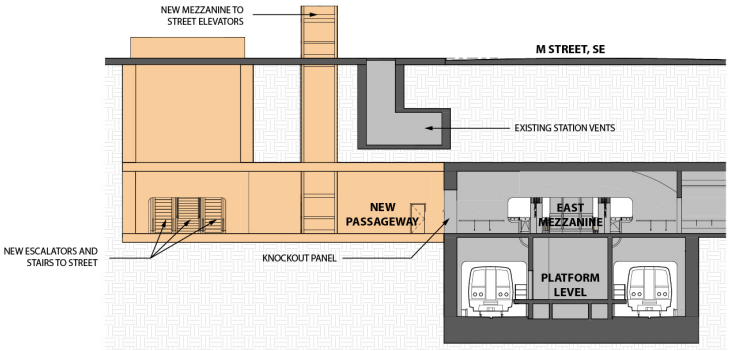
Figure ES-4: East Mezzanine Improvement Options (Mezzanine Level)



Engineering Scan

None of the three East Entrance locations are likely serious conflicts to existing utility lines that run parallel to New Jersey Avenue, SE as well as M Street, SE. In addition, all three locations clear the existing station vents located along the south side of M Street, SE (see **Figure ES-5**), which extend just over 19 feet below street level (the station and new passageway ceiling sits at approximately 22 feet below street level).

Figure ES-5: Navy Yard-Ballpark Station Section with Existing Station Vent and Proposed New Infrastructure (Entrance Location 3)



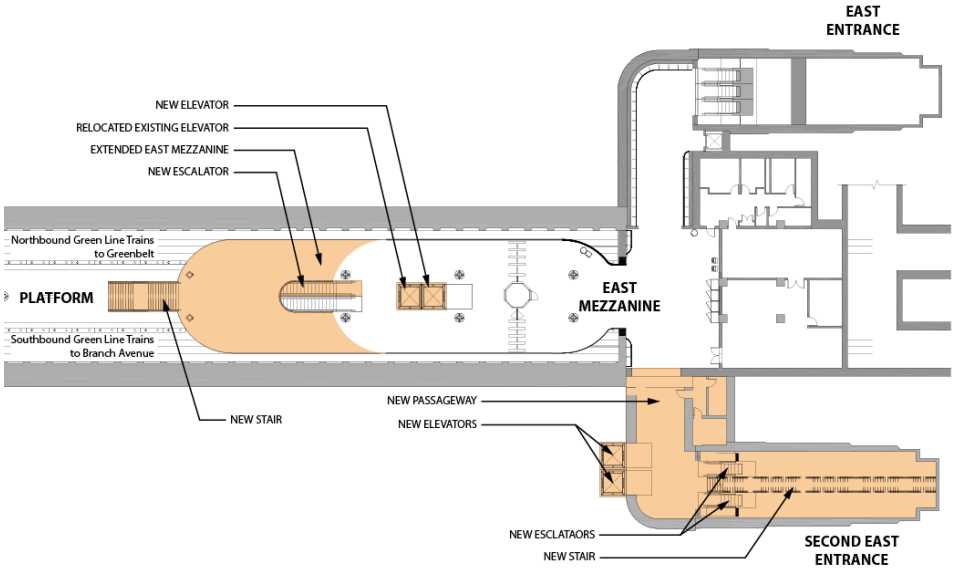
All three locations would require new elevator machine rooms, while Entrance Locations 1 and 3 would require new escalator control rooms. General electrical and mechanical upgrades would also be required as construction and installation of new equipment progresses.

Simulation Modeling of Build Alternatives

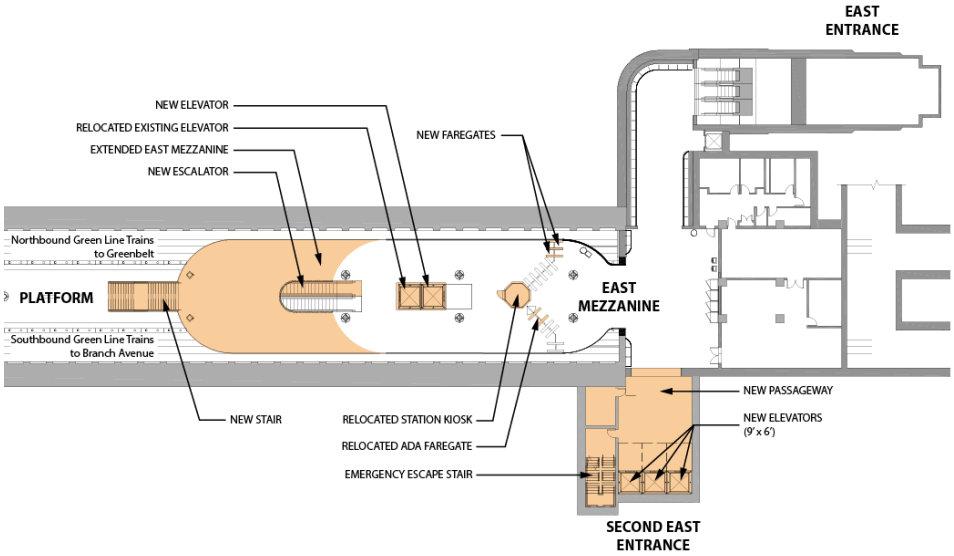
Build Alternatives were developed to test the different second East Entrance locations and East Mezzanine improvement options and evaluate the benefits of proposed station improvements (see **Figure ES-6**).

Figure ES-6: Build 2025 Alternatives (Mezzanine Level)

Alternative 1



Alternative 2



Methodology

The Build 2025 simulation model uses the same methodology, Metrorail train operations, and peak hour boardings and alightings as the No Build 2025 simulation. East Entrance entries and exits were adjusted based on the type of proposed station entrance:

- **Build 2025, Alternative 1 – Complete Entrance:** Passengers were distributed equally between the existing and second East Entrance during the peak hours based on projected travel patterns to area destinations
- **Build 2025, Alternative 2 – Elevator Entrance:** Passengers were assumed to be more likely to use the existing East Entrance during peak hours due to elevator wait times. Based on observed use of the new elevator only-entrance at Rosslyn, approximately 25% of the passengers would use the second East Entrance.

Simulation Results

The Build 2025 simulations resulted in reduced platform congestion (see **Figure ES-7**), minimal time savings impacts for those exiting the station during the AM peak 15 minutes (see **Table ES-2**), and reduced wait times at platform-to-mezzanine escalators (see **Table ES-3**).

Figure ES-7: AM Peak 15 Minutes Pedestrian LOS for Passageways – Platform Level (Build 2025, Alternative 1)

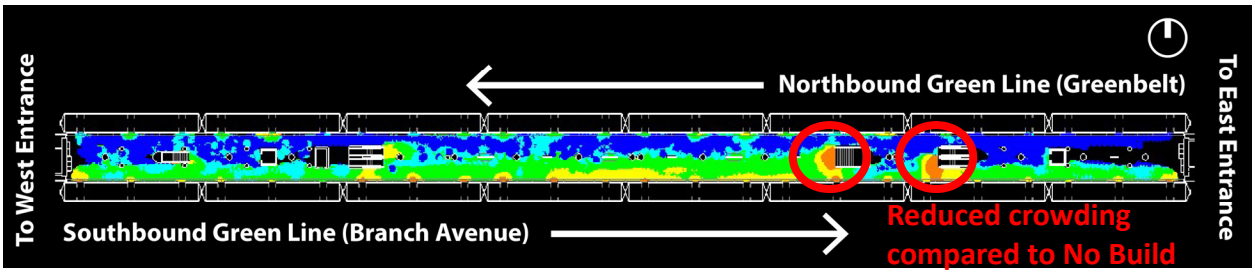


Table ES-2: Passenger Journey Time (AM Peak 15 Minutes)

	Platform to Existing East Entrance (Minutes: Seconds)	Platform to Second East Entrance (Minutes: Seconds)
Existing Conditions	2:47	-
No Build 2025	**3:31**	-
Build 2025, Alternative 1	3:01	2:56
Build 2025, Alternative 2	3:04	**3:30**

Table ES-3: Escalator/Stair Queue Clearance Time (AM Peak 15 Minutes)

	Platform to East Mezzanine Escalator (Existing)	Platform to East Mezzanine Stair (New)
Existing Conditions	1:03	N/A*
No Build 2025	**2:41**	N/A*
Build 2025, Alternative 1	0:37	0:37
Build 2025, Alternative 2	0:37	0:37

**Stair not included as part of the Existing Conditions or No Build simulations.*

Capital Cost Estimates

Conceptual capital cost estimates were developed based on WMATA specifications and industry practices (see **Table ES-4**). Construction costs are based on current year dollars.

Table ES-4: Capital Cost Estimate Summary

	Second East Entrance: Location 1 (Complete)	Second East Entrance: Location 2 (Elevator Only)	Station Entrance Canopy	East Mezzanine Improvements: Option 1A	East Mezzanine Improvements: Option 1B
Total Project Cost	$36,036,000	$22,165,000	$2,574,000	$14,872,000	$17,875,000

Conclusions

By 2025, the Navy Yard-Ballpark Metrorail station will experience increased passenger congestion based on Metrorail passenger forecasts, pedestrian simulation models, and projected future development within the Capital Riverfront neighborhood. To accommodate the increase in station activity, internal station improvements at the East Mezzanine are needed. Construction of an additional platform-to-mezzanine stair and elevator would improve internal passenger conditions and should be the primary focus of any capital improvements proposed for the station.

A second East Entrance, while helpful in providing an additional entry and egress point for passengers, is not a priority capacity investment. However, should WMATA wish to include a new station entrance as part of its future plans, coordination between WMATA and the developer of the site will be necessary.

1. Introduction

This report summarizes the findings and conclusions of the Navy Yard-Ballpark Station Access Improvements Study ("the study") conducted by the Washington Metropolitan Area Transit Authority (WMATA or "Metro").

1.1 Study Purpose and Overview

The purpose of this study was to conduct an analysis of the required station and access facilities for a second East Entrance at the Navy Yard-Ballpark Metrorail station ("the station"). The existing East Entrance is currently located on the northwest corner of New Jersey Avenue, SE and M Street, SE, facing east. The proposed new entrance would be located on the southwest corner of New Jersey Avenue and M Street, SE. This new entrance would take advantage of an existing knockout panel located on the East Mezzanine opposite the pathway to the existing East Entrance, and provide additional access to accommodate development and attractions in the Capital Riverfront area. The study also identified additional infrastructure needed within the station, including potential new vertical circulation elements (VCEs), mezzanine extensions, and faregates to accommodate future ridership. Although the station serves Nationals Park, the study did not address game day conditions, focusing only on typical, non-game day conditions.

Based on the study purpose, three goals were established in order to select the best station improvements:

1. **Reduce crowding** and improve passenger flows within the station
2. **Guide timely future development** and support the Capitol Riverfront neighborhood vision
3. **Minimize construction impacts** and provide cost-effective solutions

1.2 Background

The station is located in southeast Washington, DC, and served by the Metrorail Green Line. The underground station is located along M Street, SE with entrances at both ends of the Platform at New Jersey Avenue, SE, and Half Street, SE, in the Capitol Riverfront neighborhood. As of 2014, the station has more than 10,000 passenger boardings on an average weekday. Anchored by the Nationals Park Stadium, recent redevelopment in the Capitol Riverfront neighborhood has resulted in station ridership increasing by more than 50% over the past six years. Ridership is expected to continue to grow as additional phases of *The Yards* redevelopment and other nearby projects are constructed.

The site of the second East Entrance for the Navy Yard-Ballpark station, the southwest corner of New Jersey Avenue, SE and M Street, SE, is also the site of a Planned Unit Development (PUD) to be developed by Forest City as part of *The Yards* redevelopment. The site is currently under construction for interim uses, with new streetscapes anticipated in the short term and office development anticipated in the long term. Design options for the second East Entrance, as well as the entrance configuration and orientation, will ultimately depend on the PUD's long term program and future

tenants. **Figure 1** shows the study area with the PUD and *The Yards* redevelopment highlighted. **Figure 2** shows the site as it exists currently.

Figure 1: Navy Yard-Ballpark Station Study Area

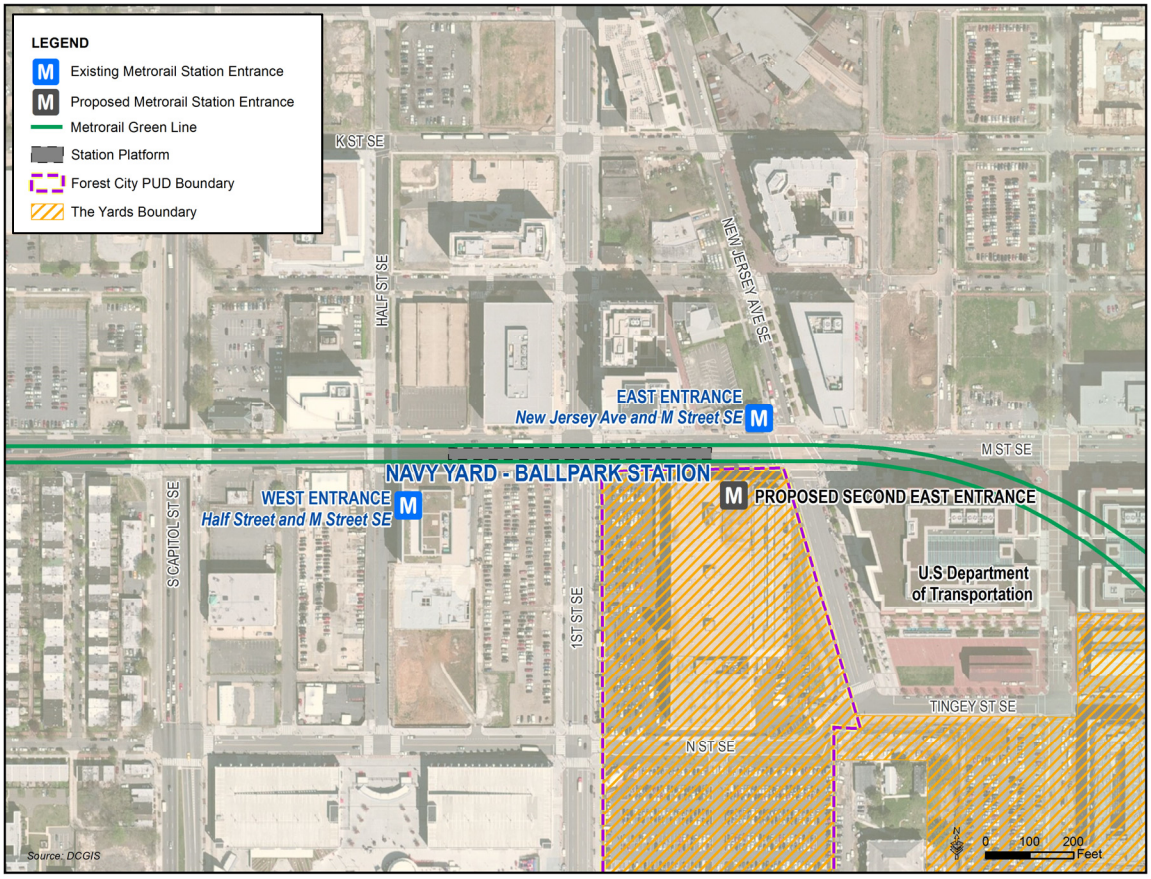


Figure 2: Site of Proposed Second East Entrance (Under Construction for Temporary Use)

1.3 Study Process

To understand internal capacity constraints, related safety concerns, and opportunities for improved access, WMATA analyzed existing conditions, ridership forecasts, and completed pedestrian simulation modeling for 2015 and 2025. Based on these simulation results, along with the coordination with area stakeholders, three design options were developed for a second East Entrance and two design options were developed for the East Mezzanine. From these design options, two Build Alternative simulations were developed, designed to test the benefits of specific station improvements shown in the Entrance locations and East Mezzanine improvements. MOEs were also used to compare the two Build Alternative simulations.

1.4 Previous Studies

The current study references the following previous studies:

M Street SE/SW Transportation Study (District Department of Transportation, 2012)

The M Street SE/SW Transportation Study (2012) identified existing and future transportation challenges and solutions for the area along M Street SE/SW and the Southwest riverfront. Specific recommendations were developed for improving pedestrian access points to transit facilities and stations, capacity enhancements for the station, and improvements to the Metrorail Green Line.

Capital Riverfront Urban Design Framework Plan (Capitol Riverfront BID, 2013)

The Capitol Riverfront Urban Design Framework Plan (2013) is a strategic plan to guide public and private investment towards a vibrant neighborhood of urban density, regional attractions, and distinct local amenities. Specific recommendations from the plan that relate to the current study include providing a direct premium rapid transit link through the Capitol Riverfront neighborhood and providing a new station entrance south of the existing East Entrance along M Street, SE to allow for a more direct connection to the Anacostia River.

2. Existing and Future Conditions

This section summarizes the existing and future conditions at the Navy Yard-Ballpark Metrorail station, including the surrounding neighborhood context, land use and demographics, historic and existing ridership, station facilities and layout, and observed passenger movements.

2.1 Station Area Overview

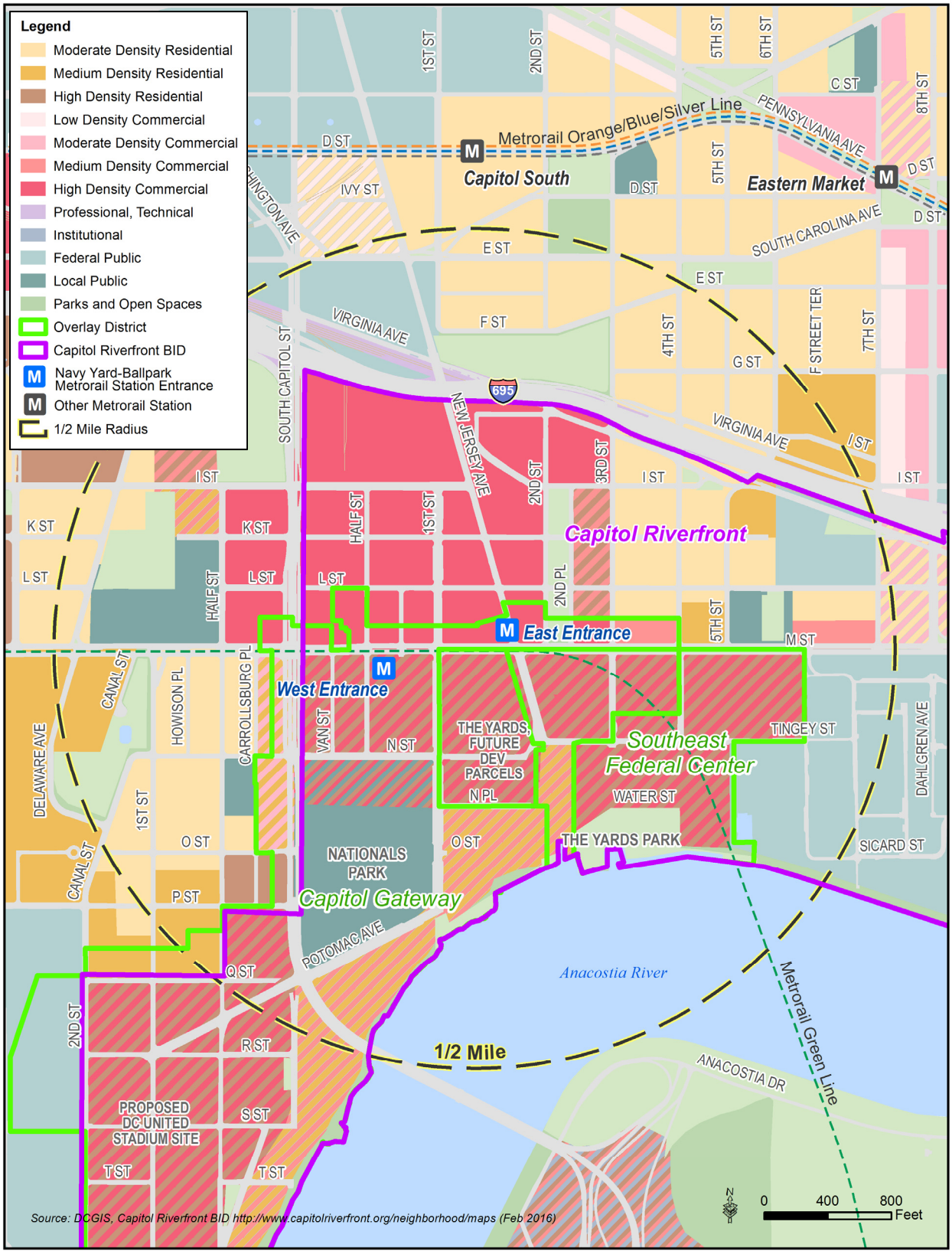
The station is located in the Capitol Riverfront neighborhood in Southeast Washington, DC. The Capitol Riverfront neighborhood has experienced an increased amount of redevelopment over the past decade. Both public and private investment has transformed the mostly underutilized industrial land into a vibrant urban neighborhood with high-density residential and commercial uses, regional attractions, and major employers. Neighborhood anchors include Nationals Park Stadium, the U.S. Department of Transportation (USDOT), and the Washington Navy Yard.

2.2 Land Use and Demographics

Land Use and Zoning

The area surrounding the station is zoned for a mix of uses, varying from lower density housing farther away from the Metrorail station entrances to higher density housing and commercial development closest to the station entrances. The immediate area around the station entrances is a mix of vacant lots awaiting redevelopment, and new medium- to high-density residential and office buildings built within the past 5 years. The DC Comprehensive Plan identifies blocks surrounding the Metrorail station to be developed into high-density mixed-use buildings. In addition, the Capitol Gateway Overlay and Southeast Federal Center Overlay districts provide additional guidance for development within the study area. **Figure 3** identifies the future land use for parcels within the study area, as well as adjacent overlay zones.

Figure 3: Future Land Use (DC Comprehensive Plan)



According to the Capitol Riverfront Business Improvement District (BID), at full build-out, the area is expected to have over 35,000,000 square feet of office, retail, and residential development. **Table 1** outlines the existing and future development of the Capitol Riverfront BID area.

Table 1: Capitol Riverfront Development Summary: Future Build-out

Estimated Delivery	Office Sq. Ft.	Retail Sq. Ft.	Residential Units	Hotel Rooms
Existing	7,331,000	249,000	3,265	372
Under Construction	225,000	192,000	3,142	365
Active Pipeline (2016 Groundbreaking)	283,000	246,000	2,662	0
Planned	4,744,000	481,000	5,542	525
Totals	12,583,000	1,168,000	14,611	1,262

Source: Capitol Riverfront BID 4Q 2015

2.3 Demographics

Within ½ mile of the Navy Yard-Ballpark station, both population and employment are forecast to increase between 2015 and 2025 with the addition of approximately 8,700 residents and 8,000 jobs. **Table 2** shows the existing and projected population and employment forecasts for the ½-mile station area. According to the MWCOG Round 8.3 Cooperative Forecasting model, most of the population and employment density increases are expected to occur in the area east of South Capitol Street, SE, adjacent to the Navy Yard-Ballpark Station entrances along M Street, SE within the Capitol Gateway Overlay and Southeast Federal Center Overlay districts.

Table 2: Navy Yard-Ballpark Station Area Demographics

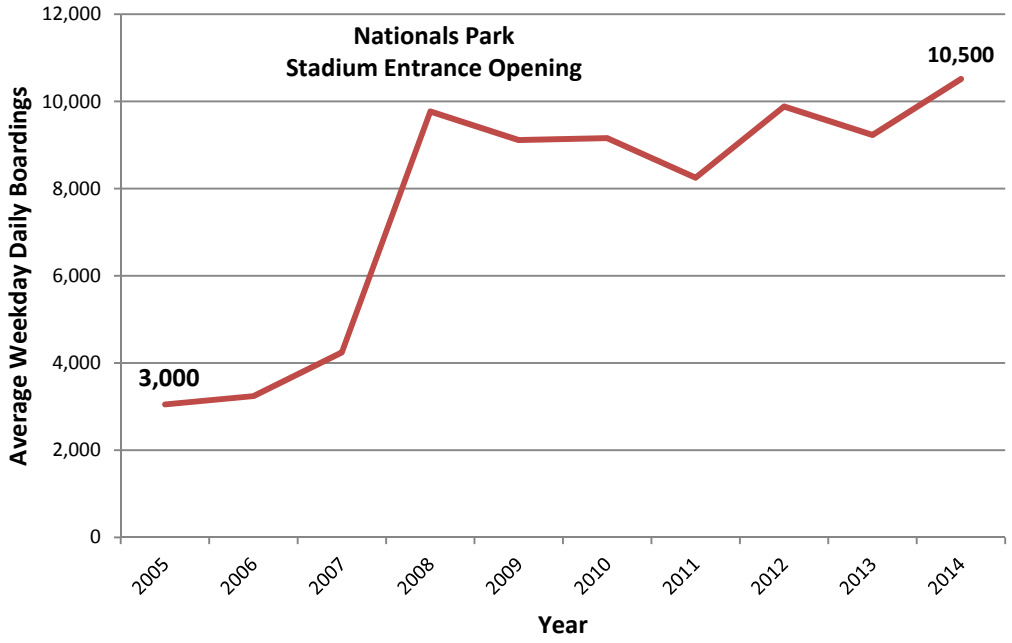
Demographic	2015	2025	Total Change (2015 – 2025)	Percent Change (2015-2025)
Population	11,500	20,200	8,700	+76%
Employment	21,000	29,000	8,100	+38%

Source: MWCOG Round 8.3 Cooperative Forecasting, DC GIS 2014

2.4 Ridership

Figure 4 shows the station's 10-year historic ridership. Ridership dramatically increased in 2008 with the opening of the West Entrance and Nationals Park Stadium.

Figure 4: Navy Yard-Ballpark Station - 10 Year Historic Ridership



Source: WMATA Historic Ridership Data (2014)

An average of 10,500 daily boardings occurs at Navy Yard-Ballpark station, with 89% of all passenger traffic arriving to the station by either walking or biking. While this average (10,500) takes into account the Ballpark activity, a typical day (non-game day) sees approximately 6,200 daily boardings, with peak periods coinciding with expected daily commuting patterns for a residential and commercial district (8:00 – 9:00 AM for the AM peak hour and 5:00 – 6:00 PM for the PM peak hour). Mezzanine faregate data indicates that approximately 80% of the people entering and exiting the station use the East Entrance in both the morning and evening peak hours.

By the year 2025, the average weekday daily boardings at the station is expected to rise to 14,000, an increase of 33% compared to 2014. **Table 3** shows the projected future average weekday daily and AM peak 15 minutes boardings at the station

Table 3: Forecast Average Weekday Boardings at Navy Yard-Ballpark Station

	2014	2020	2025	Total Change (2015 – 2025)	Percent Change (2015 – 2025)
Average Weekday Daily Boardings	10,500	11,600	14,000	3,500	+33%

Source: MWCOG 2.3 version 57 (Travel Demand Model)

2.5 Existing Station Facilities and Layout

Station Entrance Locations

East Entrance

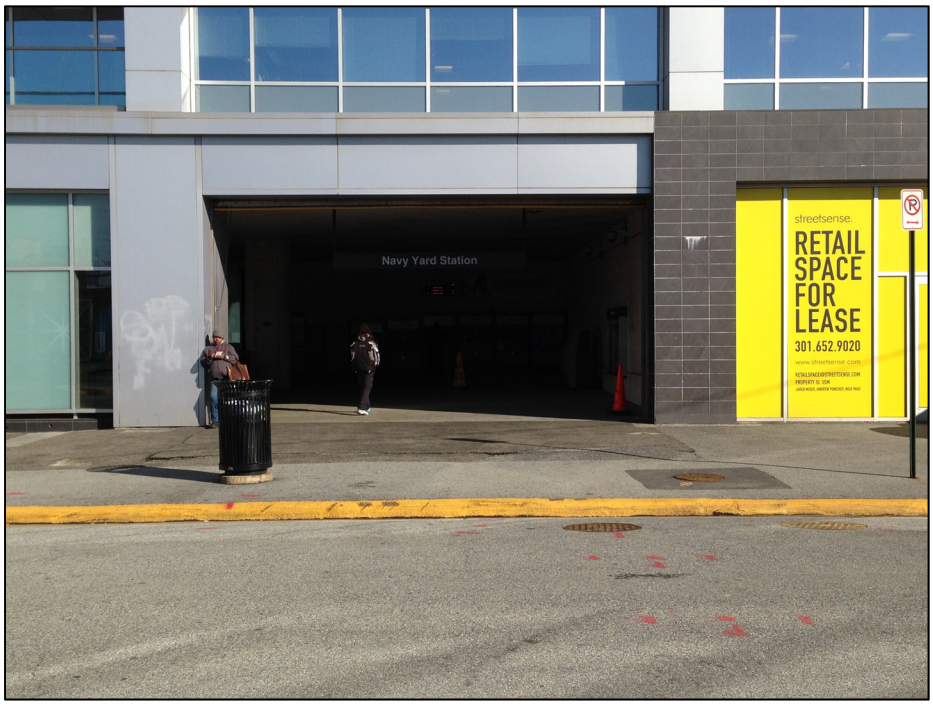
The East Entrance is located at the northwest corner of the intersection of New Jersey Avenue, SE and M Street, SE (**Figure 5**). The East Entrance features a formal canopy oriented towards New Jersey Avenue, SE, and generally serves residents and office workers with origins and destinations located to the east of the station (such as USDOT).

West Entrance

The West Entrance is located on the ground floor of 55 M Street, SE, at the southeast corner of the intersection of Half Street and M Street, SE (**Figure 6**). The entrance features faregates, ticket machines, and the station kiosk at street level, and generally serves visitors to the Nationals Park Stadium, located one block south of the entrance.

Figure 5: Navy Yard East Entrance (New Jersey Ave, SE and M Street, SE)

Figure 6: Navy Yard West Entrance (Half Street and M Street, SE)



Station Entrance Facilities and Vertical Circulation Elements

The Navy Yard-Ballpark station has two mezzanines, East and West, connected by a center platform that runs under M Street, SE. The West Mezzanine entrance facilities are located at street level, while the East Mezzanine entrance facilities are located below grade, above the platform level. **Table 4** summarizes the faregates and vertical circulation elements for each mezzanine. **Figure 7** and **Figure 8** show the faregate arrangement at the East and West mezzanine, respectively. **Figure 9** and **Figure 10** depict the mezzanine and platform level plans, and the station section, respectively.

Table 4: Navy Yard-Ballpark Station Mezzanine Facilities

Mezzanine	Faregates		Vertical Circulation Elements				
			Escalator		Elevator		Stairs
	Standard	ADA	Street to Mezzanine	Mezzanine to Platform	Street to Mezzanine	Mezzanine to Platform	Mezzanine to Platform
East	7*	1	3	1	1	1	1
West	10	2	3	2	1	1	1

*At the time of this study, the East Mezzanine has five operating standard faregates and one standard faregate reserved for New Payment Testing. The study assumes that during normal operations there are seven operating standard faregates.

Figure 7: East Mezzanine Faregates

Figure 8: West Mezzanine Faregates

Figure 9: Navy Yard-Ballpark Station Mezzanine and Platform Plans

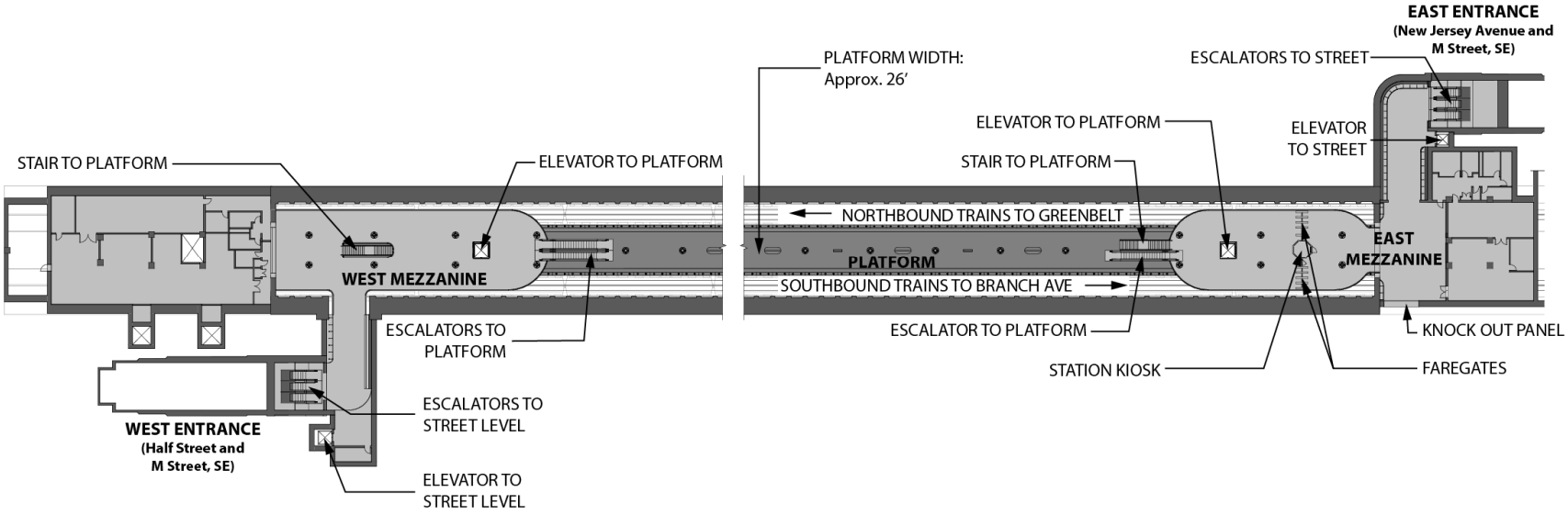
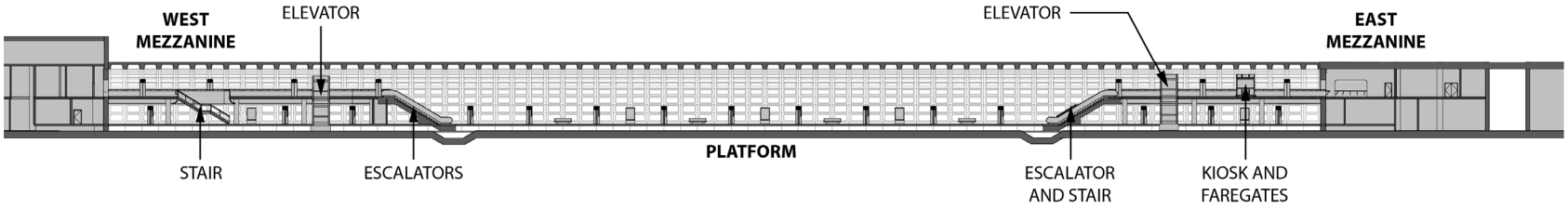


Figure 10: Navy Yard-Ballpark Station Section



2.6 Observed Passenger Movements

Site visits were made on two consecutive weekdays in February 2015 to observe station conditions and passenger movements. Passenger movements at the East Entrance street level were observed for 15 minutes during the AM and PM peak periods. Station activity was observed during the AM and PM peak periods for the East and West Mezzanines, corresponding faregate areas, and train platform areas. Station observations focused on areas of crowding, movement conflicts, and any potential safety issues related to station passenger circulation.

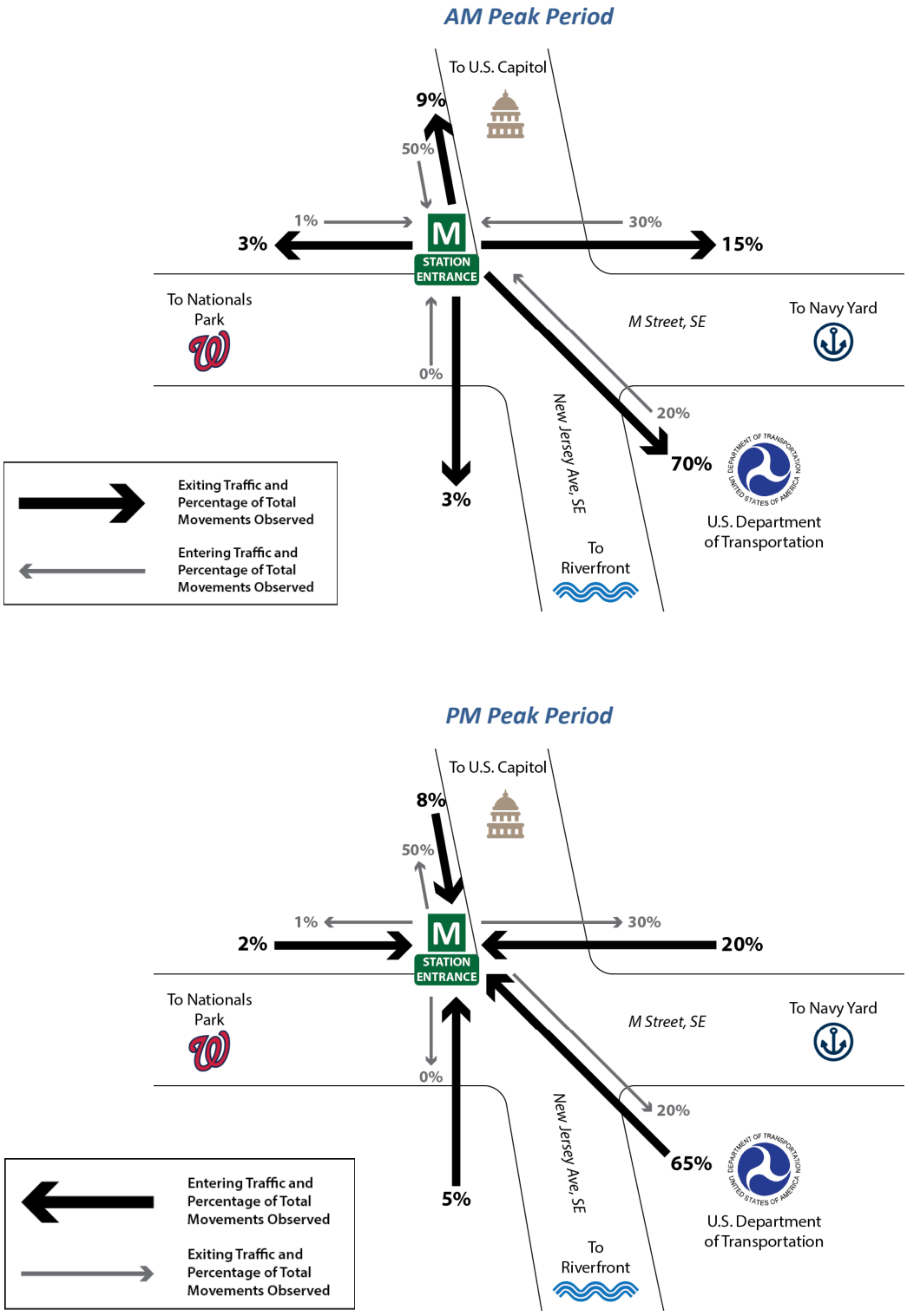
East Entrance

During the AM peak, more passengers exit the station than enter. The majority of exiting traffic walked towards the southeast corner of New Jersey Avenue, SE and M Street, SE, near the USDOT Headquarters. The second largest group of exiting traffic continued east along M Street, SE. Most of the entering traffic arrived from the north along New Jersey Avenue, SE.

During the PM peak, more passengers enter the station than exit. Movements during this time period mirror the AM peak, with the majority of entering traffic coming from the southeast corner of New Jersey Avenue, SE and M Street, SE, followed by entering traffic from the east along M Street, SE. Most of the exiting traffic continued north along New Jersey Avenue, SE.

Figure 11 shows the distribution of passengers entering and exiting the station via the East Entrance both during the AM and PM peak periods.

Figure 11: Existing East Entrance Peak Period Pedestrian Movements



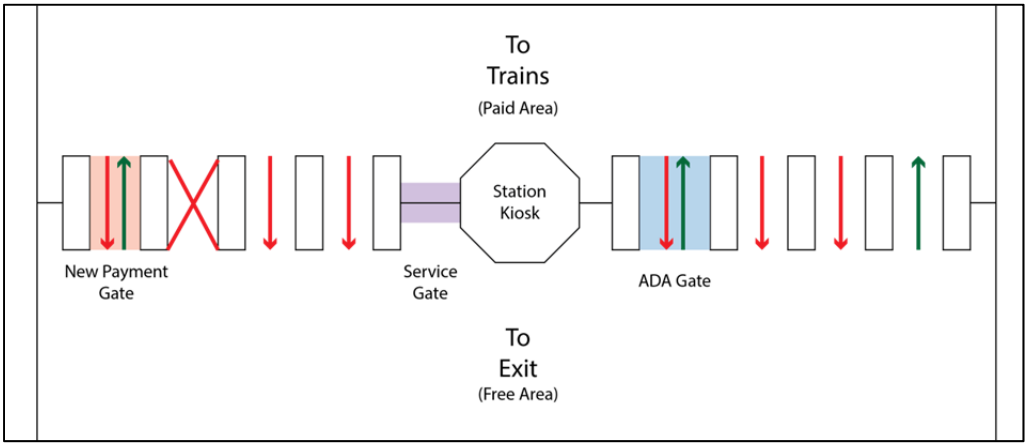
Source: Based on Pedestrian Observation during AM and PM peak periods, AECOM.

Mezzanines

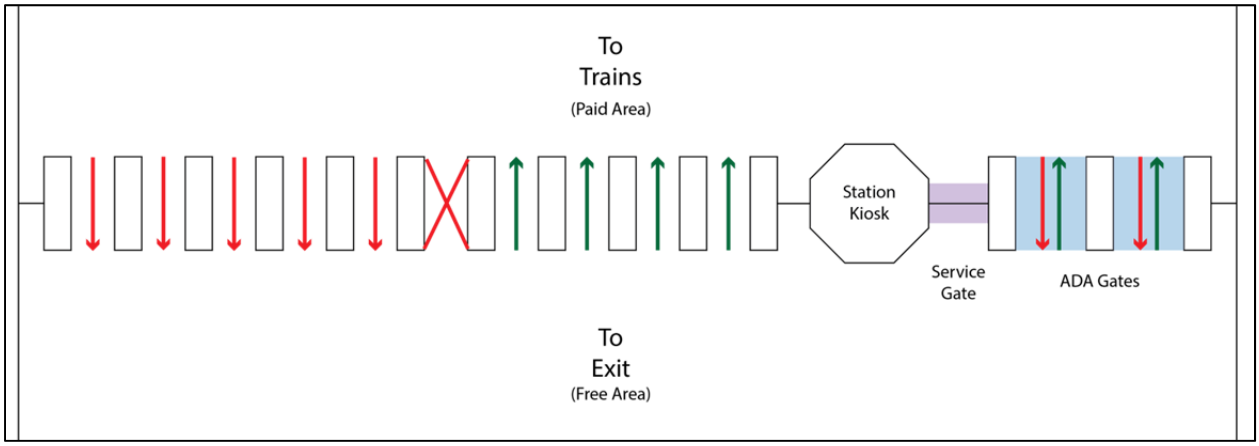
Figure 12 shows the faregate alignment for both the East Mezzanine and West Mezzanine. On the East Mezzanine, moderate queueing at the faregates was observed for passengers exiting and entering the station during the AM peak (**Figure 13**). No queuing was observed at the faregates during the PM peak. On the West Mezzanine, no queuing was observed at the faregates or near any of the VCEs during the AM and PM peak periods.

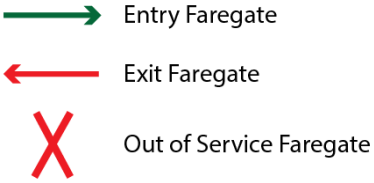
Figure 12: AM Peak Station Faregate Configurations

East Mezzanine



West Mezzanine





Platform

During the AM peak hour, approximately 80% of observed passengers exited southbound trains towards the East Mezzanine, with boardings for northbound trains spread across the Platform. Significant queues and crowding also developed at the bottom of the platform escalator and stairs to exit the station via the East Mezzanine. Queues were observed that backed up to approximately the halfway point of the Platform (**Figure 13**), and passengers using the stairs to exit conflicted with those using the stairs to get down to the Platform.

During the PM peak period, passengers were spread evenly across the Platform to board northbound trains. In addition, there was typically a rush to board the last few cars from passengers entering from the East Mezzanine.

Figure 13: AM Peak Passenger Congestion within Navy Yard-Ballpark Station

Moderate Congestion at East Mezzanine Faregates

Platform Congestion and Queuing at Platform to Mezzanine VCEs

3. Simulation Modeling of Existing and Future Conditions

This section summarizes the existing year (2015) and future year (2025) conditions for the Navy Yard-Ballpark Metrorail station. The simulated conditions are based on pedestrian simulation modeling of existing ("Existing Conditions") and forecast ("No Build 2025") passenger volumes with current station facilities. While the current station does not experience severe crowding during typical operations, anticipated Metrorail ridership growth and future development in the area could result in passenger overcrowding and movement conflicts on platforms, mezzanines, and vertical circulation elements (VCEs).

3.1 Methodology

The simulations were conducted using Legion SpaceWorks software, modeling conditions during the AM and PM peak hours for the two time periods (2015 and 2025) based on the existing station layout. Based on the station entries and exits and travel demand forecast, the AM peak hour is 7:30 AM to 8:30 AM, while the AM peak 15 minutes is 8:00 AM to 8:15 AM. The PM peak hour is 4:30 PM to 5:30 PM, while the PM peak 15 minutes is 5:15 PM to 5:30 PM.

Ridership

The study analyzed station ridership for both the Existing Conditions and the No Build 2025 simulation, based on existing and future population and employment for the area within ½ mile radius of the station. For the Existing Conditions, the study used 2014 WMATA faregate data to determine the distribution of Metrorail boardings and alightings and station entries and exits for passengers accessing the station via the East or West Entrance. For the No Build 2025 simulation, the study used 2025 TAZ data to distribute Metrorail boardings and alightings between the East and West Entrances based on future population and employment within the station area. In addition, the distribution of station entries and exits between the East and West Entrances accounts for future population and employment growth within the station area for the No Build 2025 simulation.

Table 5 shows the number of total entries and exits during the AM peak 15 minutes at the station (using both the East and West Entrances). **Appendix A** contains the full distribution of passengers using the East and West Entrances for boarding and alighting, as well as the number of station entries and exits for both the Existing Conditions and No Build 2025 simulation.

Table 5: AM Peak 15 Minutes Station Entries and Exits – Existing Conditions, No Build 2025

	Existing Conditions		No Build 2025	
	East Entrance	West Entrance	East Entrance	West Entrance
Entries	67	43	140	125
Exits	254	32	614	263

Source: October WMATA Faregate Data for Existing Condition, MWCOG 2.3 version 57 (Travel Demand Model) with Round 8.3 Cooperative Land Use Forecast Data for No Build 2025 simulation.

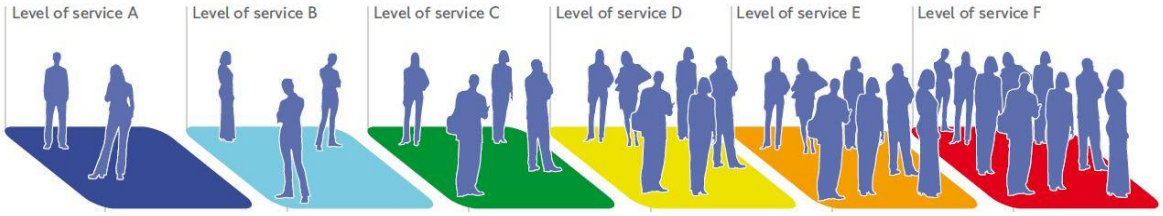
Metrorail Operations

The Existing Condition modeling was conducted based on the current Metrorail train operating plan (effective July 2014), with Green Line trains serving the station every 6 minutes during peak periods and every 12 minutes during off peak periods. The No Build 2025 simulation is based on the 2018 operating plan, which uses the same frequency for Green Line trains as the 2014 plan. **Appendix B** contains the full Metrorail operating plans for both 2014 and 2018.

3.2 Measures of Effectiveness (MOEs)

The following MOEs were used to evaluate station performance for both the Existing Condition and the No Build 2025 simulation:

1. **Pedestrian Level of Service (LOS) for Passageways (AM peak 15 minutes) –** Determines the LOS along the Platform and on the mezzanines, and evaluates percentage of passengers experiencing LOS E and F within specific zones within the station. Passenger density maps were established for the peak 15 minutes during the AM peak hour. The following key shows the different LOS ratings as illustrated by the maps:



Using criteria in the Transportation Research Board's Transit Capacity and Quality of Service Manual (2nd Edition), the typical design target for pedestrian walking space, including platforms and mezzanines, is LOS C (green), with LOS D (yellow) being acceptable. Areas of orange and red denote LOS E and F, respectively, which indicate unacceptable conditions.

2. **Alighting Passenger Journey Time (AM peak) –** Measures the average journey time for passengers leaving trains to reaching the station entrance, in minutes and seconds.

3. **Vertical Circulation Element (VCE) Queue Clearance Time (AM peak 15 minutes) –** Measures the average time required to completely clear the queue for a VCE within the station, in minutes and seconds.

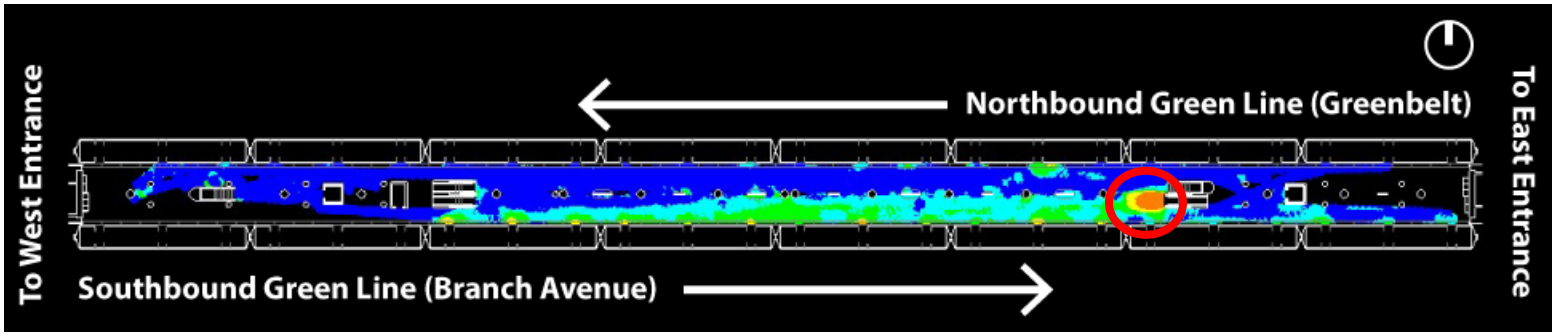
3.3 Comparison of Existing Conditions and No Build 2025

Pedestrian LOS for Passageways (AM Peak 15 Minutes)

Figure 14 and **Figure 15** illustrate the LOS for the AM peak 15 minutes at the Platform and mezzanines, respectively, for the Existing Conditions and the No Build 2025 simulation, respectively. Areas of LOS E and F (significant congestion) are highlighted on the figures. Simulations for the PM peak 15 minutes are not shown due to the lack of any significant congestion.

Figure 14: AM Peak 15 Minutes Pedestrian LOS for Passageways – Platform Level

Existing Conditions



No Build 2025

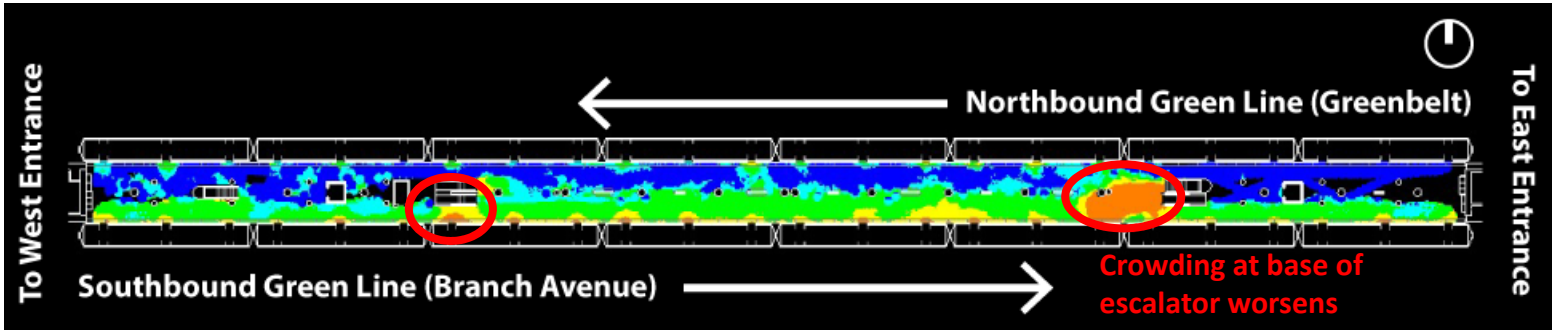
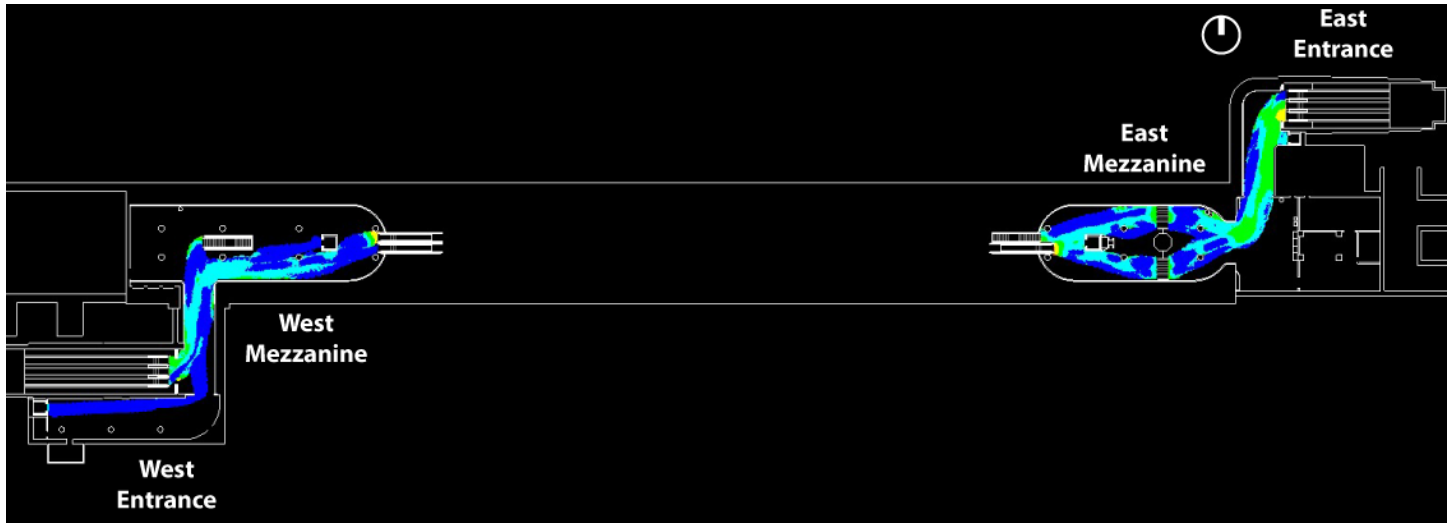


Figure 15: AM Peak 15 Minutes Pedestrian LOS for Passageways – Mezzanine Level

Existing Conditions

No Build 2025



The significant congestion that occurs on the Platform at the base of the escalator leading up to the East Mezzanine in the Existing Conditions is exacerbated in the No Build 2025 simulation (**Figure 14**). Significant congestion also occurs along the platform edge for southbound trains in the No Build 2025 simulation, particularly in the narrow area just south of the escalator leading up to the West Mezzanine (this does not appear in the Existing Conditions). No significant congestion occurs on either of the Mezzanines or at the VCEs leading to either the West or East Entrances during the AM peak in both the Existing Conditions and No Build 2025 simulation (**Figure 15**).

Zone Analysis Densities

The following pages summarize the density analysis results for Navy Yard-Ballpark Station. **Figure 16** depicts the analysis zones of key pedestrian circulation areas used for calculating the percentages of passengers in LOS E and F from the simulations. **Table 6** lists the average LOS E and F during the AM peak period.

Figure 16: Navy Yard Pedestrian Density Analysis Zones

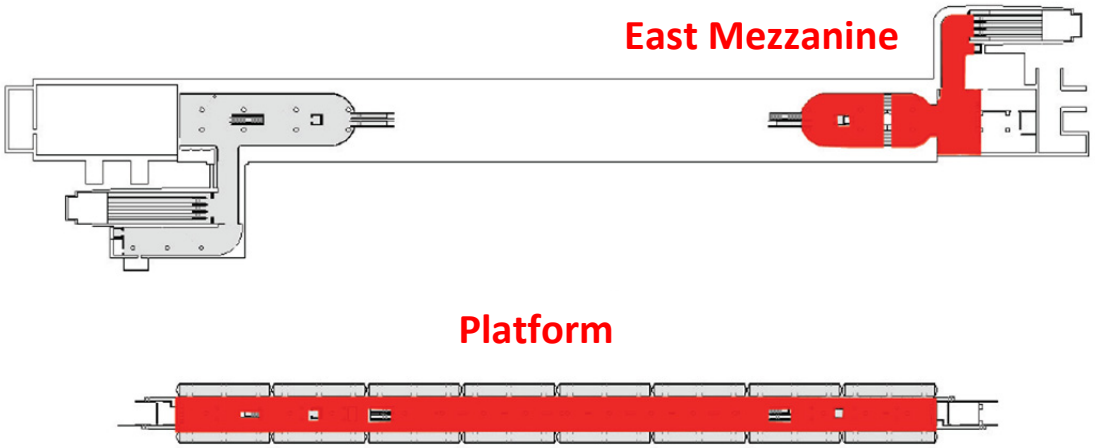


Table 6: AM Peak Hour % LOS E and F – Existing Conditions and No Build 2025

	East Mezzanine Combined LOS E & F		Platform Combined LOS E & F	
	Peak Hour	Peak 15 Minutes	Peak Hour	Peak 15 Minutes
Existing Conditions	0	0	3	7
No Build 2025	1	2	13	**22**

The amount of significant congestion along the platform is greatly increased in the No Build 2025 simulation compared to the Existing Conditions. During the AM peak 15 minutes, 22% of the station platform experiences LOS E or F, over triple the amount of significant congestion compared to the Existing Conditions during the same time period (7%). The East Mezzanine experiences virtually no change in significant congestion between the Existing Conditions and the No Build 2025 simulation.

Faregate Analysis

The study evaluated faregate capacity relative to passenger entry and exit volumes (see **Appendix C**). Based on the faregate analysis using WMATA's Design Criteria, two additional faregates are needed at the East Mezzanine to accommodate AM peak hour usage.

Alighting Passenger Journey Time (AM Peak)

Table 7 shows the alighting journey time for passengers traveling from the Platform to the street level via the existing East Entrance during the AM peak.

Table 7: Alighting Passenger Journey Time – Existing Conditions and No Build 2025 (AM Peak)

	Platform to East Entrance (Minutes: Seconds)	
	Peak Hour	Peak 15 Minutes
Existing Conditions	2:42	2:47
No Build 2025	3:06	**3:31**

Compared to the Existing Conditions, alighting time both during the peak hour and peak 15 minutes increases significantly, with the peak 15 minutes alighting time increasing by 44 seconds.

VCE Queue Clearance Time

The busiest VCEs were analyzed to determine the resulting queue clearance times for the Existing Conditions and No Build simulations; other VCEs that were viewed to have no significant queuing during the peak hours were excluded from the detailed analysis. **Table 8** lists the average VCE queue clearance times (recorded in minutes:seconds) derived from the simulations.

Table 8: Average AM Peak 15 Minutes Escalator Clearance Time – Existing Conditions and No Build 2025

	Platform to East Mezzanine (Minutes: Seconds)	East Mezzanine to Street Level (Minutes: Seconds)
Existing Conditions	1:03	No Queue
No Build 2025	**2:41**	No Queue

The queue clearance time for the platform-to-East Mezzanine escalator increases sharply from the Existing Conditions to the No Build 2025, adding over 90 seconds to the clearance time. No queues appear at East Mezzanine-to-street level escalator/stair during the Existing Conditions or the No Build 2025 simulation.

VCE Analysis

The study evaluated escalator and stairway capacity relative to passenger volumes within the station (see **Appendix D**). Based on the VCE analysis using WMATA's Design Criteria, the study determined that additional VCEs are needed between the East Mezzanine and Platform.

3.4 Summary of No Build 2025 Conditions

The Existing Conditions and No Build 2025 simulations yielded the following results:

- **Increased Congestion along Station Platform -** During the AM peak period, significant congestion worsened along the Platform, increasing the overall LOS E&F along the Platform to 22% in the No Build 2025 simulations. The bulk of the congestion occurred at the base of the platform-to-East Mezzanine escalator.
- **Increased Travel Time –** Both passenger alighting time and VCE queue clearance time for the platform-to-East Mezzanine escalator increased significantly during the AM peak period from the Existing Conditions to the No Build 2025 simulation.
- **Increased Safety Concerns –** The simulated increases in congestion, travel time, and queue clearance time signify that the existing Platform and East Mezzanine would not be able to adequately handle future passenger traffic in 2025, increasing potential safety risks within the station.

4. Design Options

This section summarizes the agency and stakeholder feedback, as well as the design options considered for both the East Mezzanine improvements and the new East Entrance. Improvements to the West Mezzanine and West Entrance were not considered as there were no significant congestion issues at either location for both the Existing Conditions and No Build 2025 simulations.

4.1 Agency and Stakeholder Feedback

WMATA Office of ADA Policy and Planning (ADAP)

ADAP provided specific guidance on station accessibility and design requirements related to elevators, accessible pathways, emergency egress facilities, and other station elements.

District Department of Transportation (DDOT)

DDOT requested that a new station entrance be integrated into the future Forest City development at the southwest corner of New Jersey Avenue, SE and M Street, SE within private property.

DC State Historic and Preservation Office (SHPO)

The SHPO expressed the importance of maintaining the New Jersey Avenue, SE viewshed to the U.S. Capitol, discouraging the use of public space for elevators and canopies. The construction of these elements could potentially block views of the U.S. Capitol along New Jersey Avenue, SE.

Forest City

Forest City provided feedback on the need to allow for flexibility of designing the second East Entrance, as its long term development plans have not been finalized. For example, New Jersey Avenue and M Street, SE could become a valuable retail corner or the future tenant of this location could be a Federal government agency, requiring additional security.

Capitol Riverfront BID

The Capitol Riverfront BID expressed their support for a second East Entrance at the station, stating their preference for a complete station entrance as opposed to an elevator-only option.

4.2 Initial Design Options

Second East Entrance

Three second East Entrance locations were developed. **Figure 17** shows the location of the proposed locations at the street level, including the orientation of proposed complete entrances and elevator only options. All three locations take advantage of the existing knockout panel located on the south end of the East Mezzanine (**Figure 18**).

Figure 17: Location of Second East Entrance Design Options at Street Level

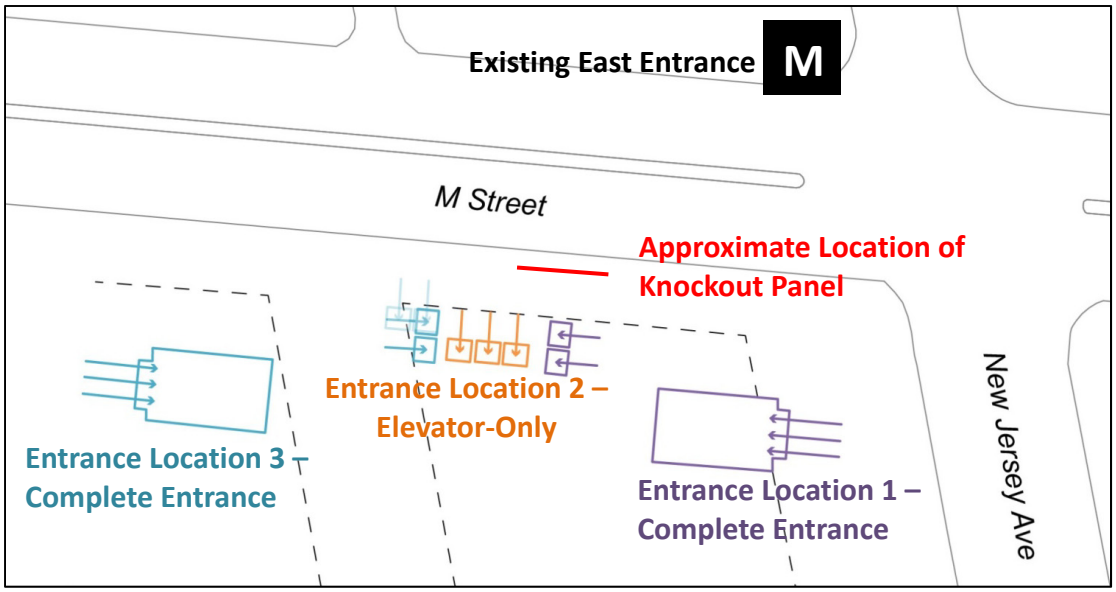
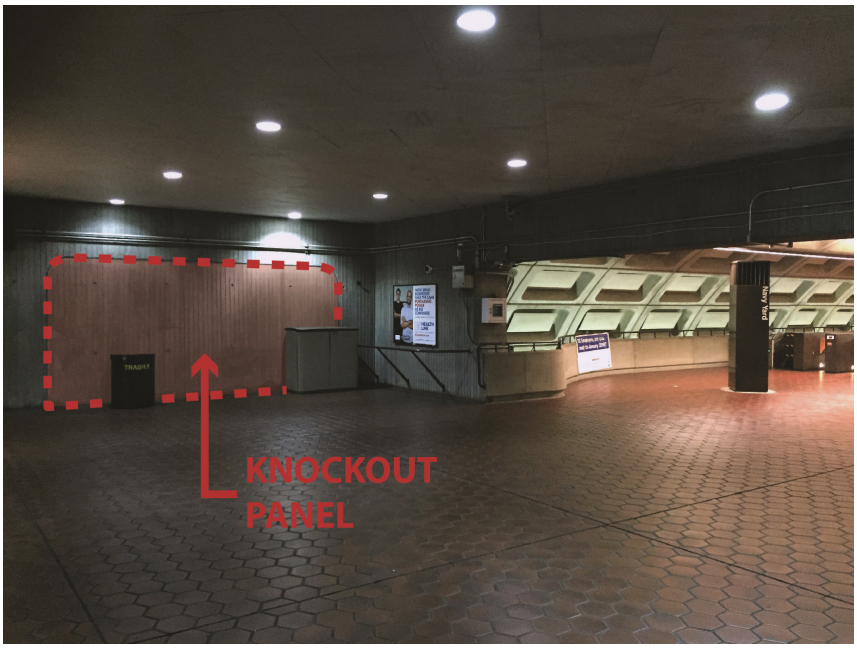


Figure 18: Existing East Mezzanine Knockout Panel



Entrance Location 1: Complete Entrance Facing New Jersey Avenue, SE

Two new escalators and a stair connect the East Mezzanine to the street, with a new complete station entrance on the corner of New Jersey Avenue, SE and M Street, SE, facing New Jersey Avenue, SE. A new passageway connects the new mezzanine-to-street VCEs via the existing East Mezzanine knockout panel. Two new elevators also connect the East Mezzanine to the street, facing M Street, SE. The new entrance may feature either a station canopy or be included as part of the future development.

Entrance Location 2: Elevator-Only Midblock Entrance Facing M Street, SE

Three new mezzanine-to-street elevators connect to the existing East Mezzanine via a new passageway and the existing East Mezzanine knockout panel. An emergency exit stair is also included. The elevators at street level are located just west of the intersection of New Jersey Avenue, SE and M Street, SE.

Entrance Location 3: Complete Midblock Entrance Along M Street, SE

Two new escalators and a stair connect the East Mezzanine to the street, with a new complete station entrance located just south of M Street, SE, facing the midblock. A new passageway connects the new mezzanine-to-street VCEs via the existing East Mezzanine knockout panel. Two new elevators also connect the East Mezzanine to the street, facing M Street, SE. The new entrance may feature either a station canopy or be included as part of the future development.

Figure 19 through **Figure 21** illustrate Entrance Locations 1, 2, and 3 both at the mezzanine and street levels, respectively.

Figure 19: Entrance Location 1

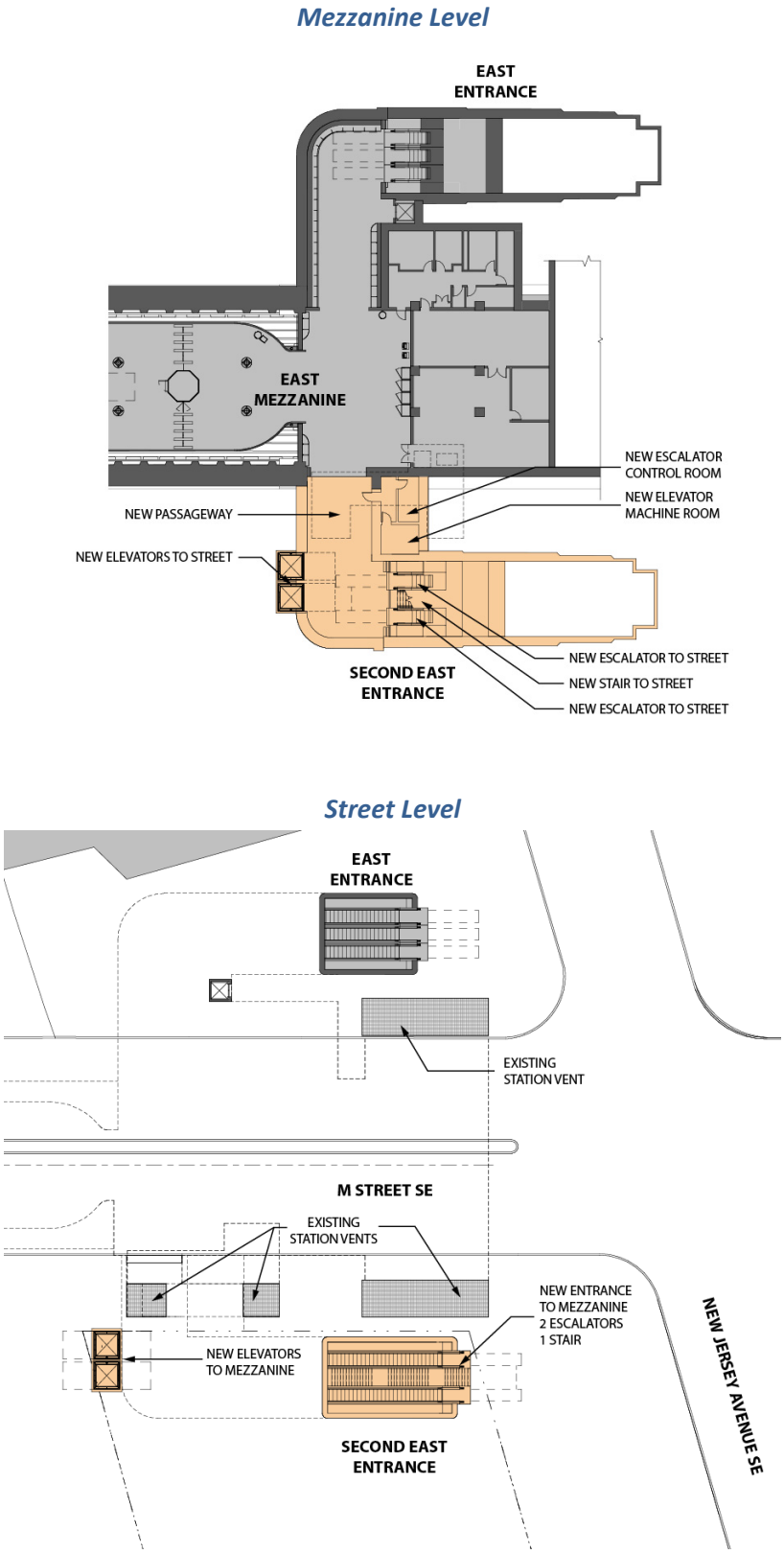


Figure 20: Entrance Location 2

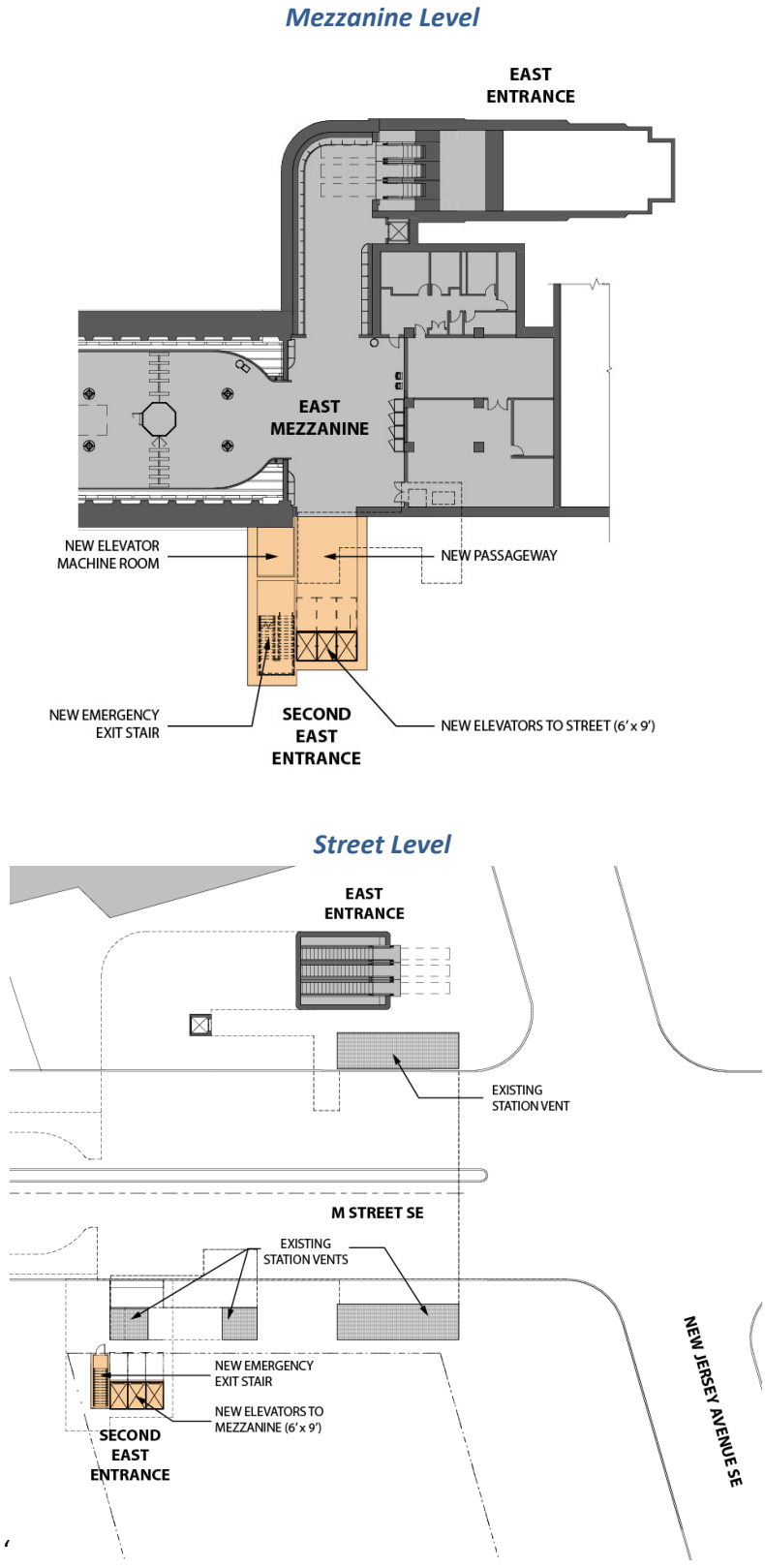
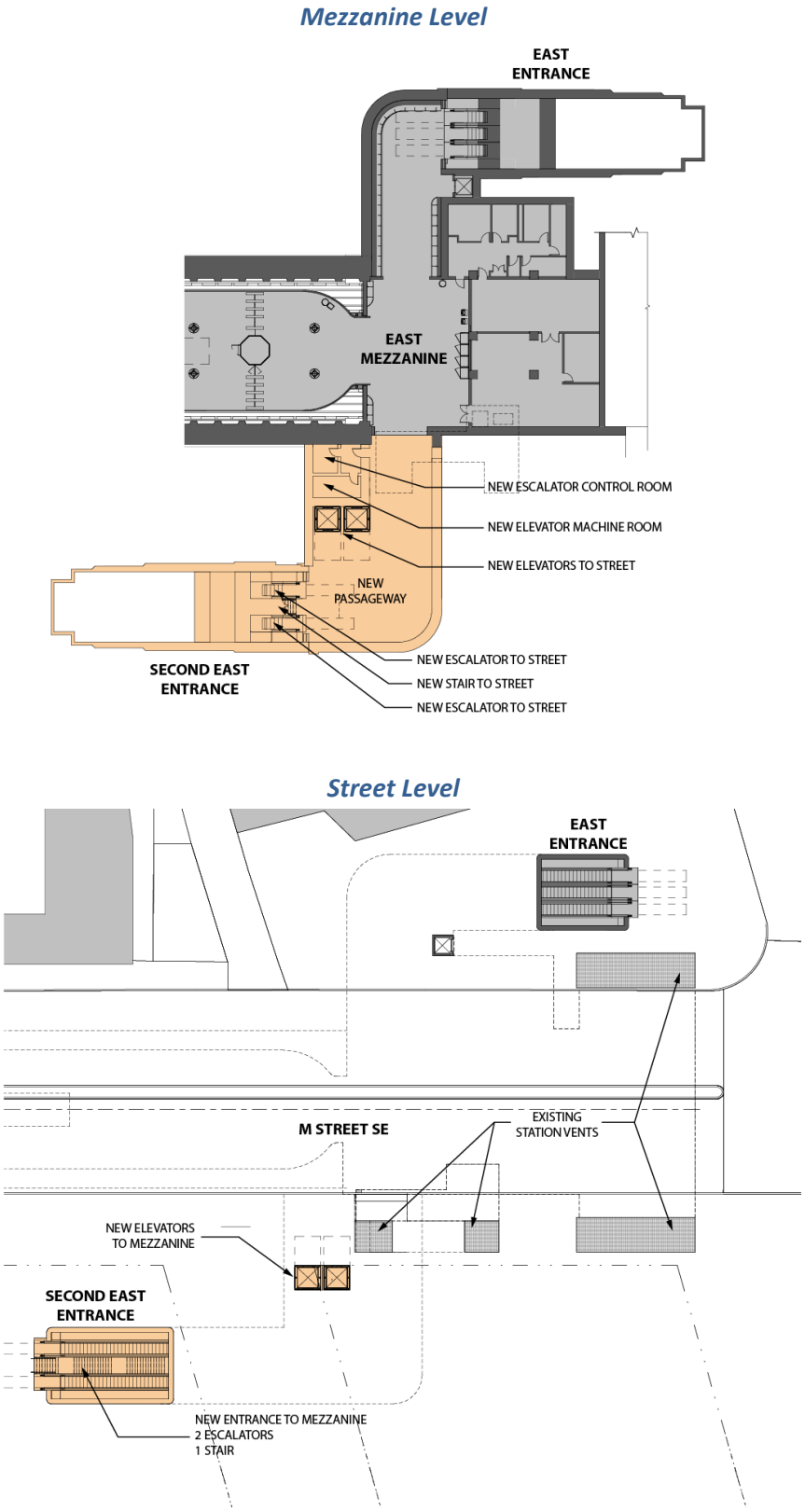


Figure 21: Entrance Location 3



Other Locations Considered But Not Advanced

Two other locations for the new East Entrance were also considered:

- **Second East Entrance with Stair Only –** A second East Entrance featuring a mezzanine-to-street stair with no escalator or elevator service. While this location could help reduce costs associated with a new entrance, this option would be less desirable from an access standpoint due to the change in elevation between the East Mezzanine and street level.

- **Second East Entrance Located Closer to the Riverfront** – A longer new pedestrian passageway connecting the East Mezzanine at the knockout panel to points south of the station near the riverfront. While this location could increase entrance usage near the riverfront, such a long passageway would be considerably more expensive to build compared to the other locations above.

East Mezzanine Improvements

The proposed improvements for the East Mezzanine include the following:

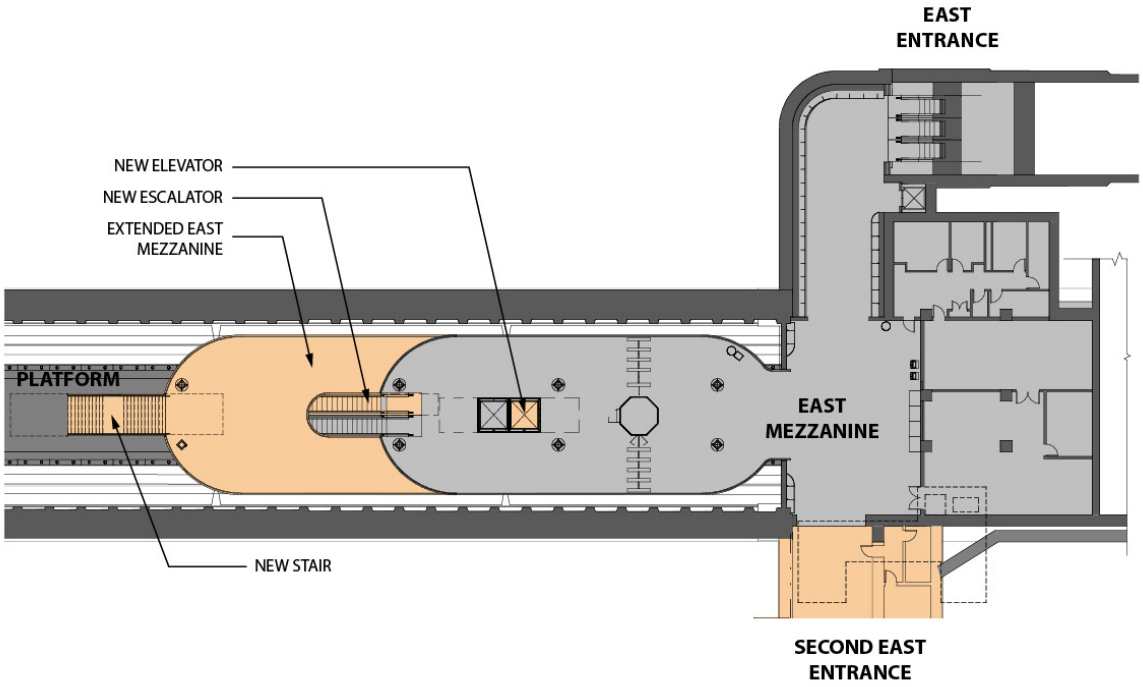
- **Expanded Mezzanine and Vertical Circulation Capacity –** An expanded East Mezzanine would allow for more passengers to move off the Platform and onto the mezzanine, helping to separate boarding and alighting passengers, and moving more passengers away from active train tracks. A new platform-to-mezzanine stair would connect the Platform to the expanded East Mezzanine while a new escalator would replace the existing platform-to-mezzanine stair (next to the existing escalator). In addition, a new elevator would also connect the Platform to the East Mezzanine, providing a second ADA pathway. The new VCEs would help to relieve crowding along the Platform, decrease alighting journey time, reduce queues at the platform-to-East Mezzanine VCEs, and improve overall safety along the platform.

- **Potential New Faregates** – Based on the WMATA Design Criteria, two additional faregates for the East Mezzanine. However, spatial constraints on the existing East Mezzanine limit the feasibility of adding faregates.

Figure 22 identifies the two East Mezzanine improvements options recommended for the station. Both options include the extended East Mezzanine, new platform-to-mezzanine stair, and new platform-to-mezzanine escalator. Option 1A includes a new platform-to-mezzanine elevator adjacent to the existing elevator, while Option 1B includes a new platform-to-mezzanine elevator, relocates the existing platform-to-mezzanine elevator, and relocates the existing station kiosk. **Figure 23** illustrates the location of the proposed East Mezzanine improvements within the station.

Figure 22: Navy Yard-Ballpark Station East Mezzanine Improvements

East Mezzanine Improvements: Option 1A



East Mezzanine Improvements: Option 1B

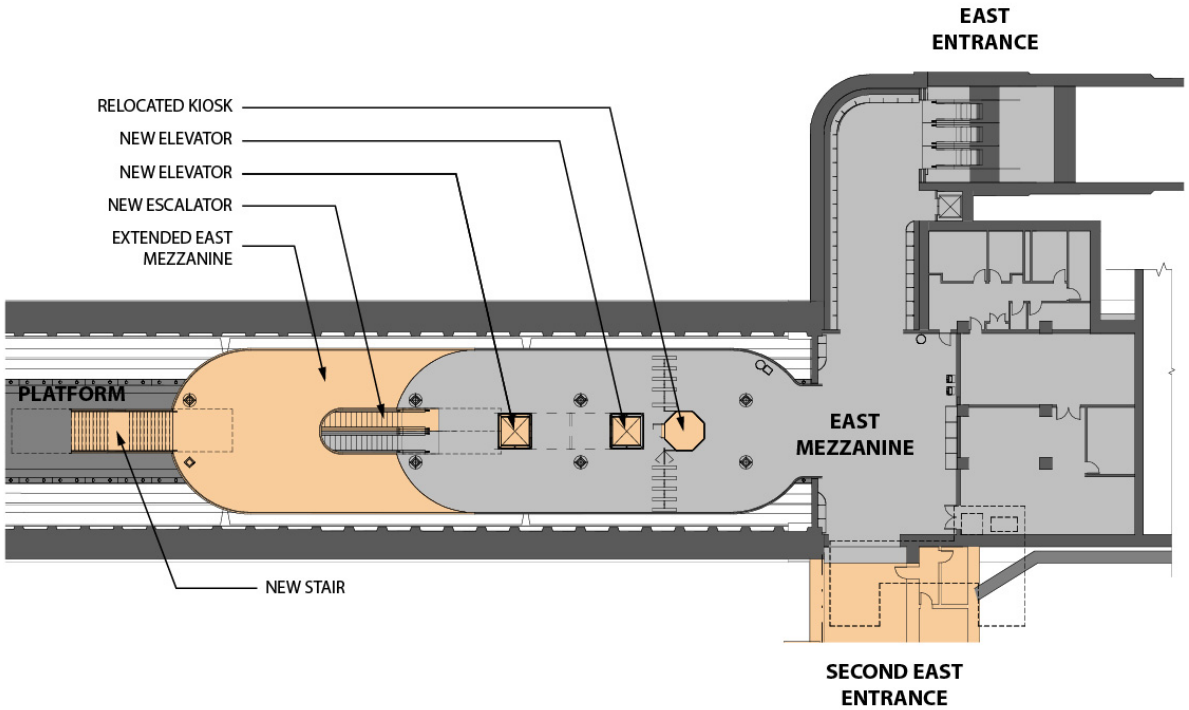
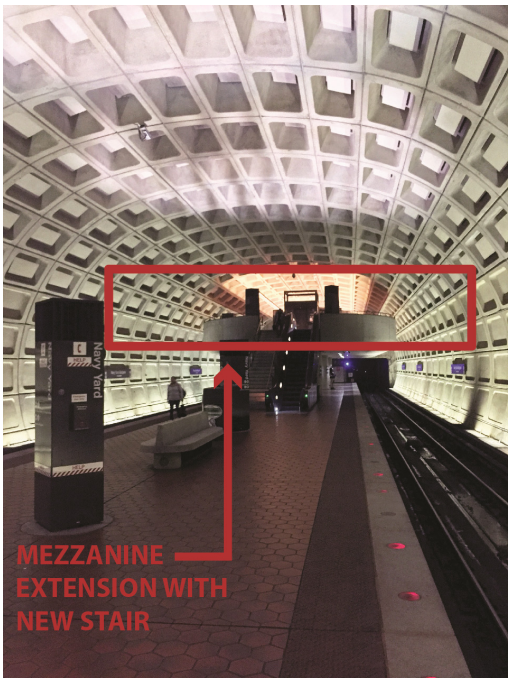


Figure 23: Proposed Locations of East Mezzanine Improvements

East Mezzanine Extension



New Platform-to-Mezzanine Elevator, Mezzanine Level

New Platform-to-Mezzanine Escalator, Platform Level

New Platform-to-Mezzanine Elevator, Platform Level

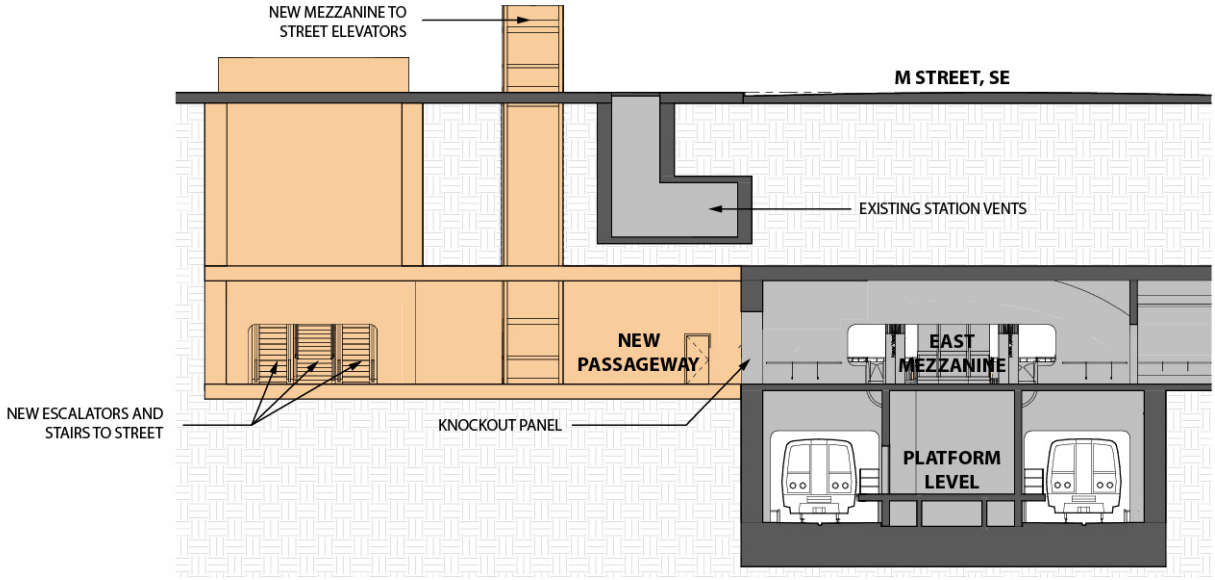
5. Engineering Scan

This section provides a summary of the potential engineering and constructability concerns. **Appendix E** provides a more detailed version of the engineering and constructability concerns. **Appendix F** provides site plans illustrating the location of the existing station infrastructure, utility lines, and area for the proposed second East Entrance.

5.1 Existing Utilities and Station Vents

There are multiple utility lines, including storm drains, sanitary, gas, water, phone, and electric lines within the roadway that run parallel to M Street, SE as well as New Jersey Avenue, SE. Additionally, there are three large Metrorail vents adjacent to the sidewalk on eastbound M Street, SE near the corner of New Jersey Avenue, SE, including one vent near the location of the existing knockout panel. Based upon site observation and the existing as-built drawings of the station area, it does not appear that any other utilities exist at the knockout panel location. **Figure 24** illustrates the new passageway and elevators as they relate to the existing station vent and infrastructure. None of the three East Entrance locations suggest serious utility complications and all options clear the existing station vent, both horizontally and vertically. The existing station vents extend to just over 19 feet below street level, while the top of the ceiling for the East Mezzanine and new passageway sits at approximately 22 feet below street level.

Figure 24: Navy Yard-Ballpark Station Section with Existing Station Vent and Proposed New Infrastructure (East Entrance Location 3)



5.2 Potential Engineering and Constructability Concerns

Mechanical and Electric Considerations

East Entrance Locations 1 and 3 both require new escalator control rooms, and all three locations require new elevator machine rooms. Drainage systems will be required for elevators, escalators, and stairwells. Further consideration will be necessary to determine the feasibility of connection into the existing station drainage system or if a new connection to nearby storm drainage is necessary, which would require sump pumps. Because the station is below grade and interconnects underground tracks on both ends of the station, the proposed new entrance may impact both the normal and emergency ventilation. Further study should be provided to determine any impacts and mitigation. Existing AC switchboards will be sufficient to power new mechanical equipment and lighting required by a new station entrance, although other new electrical equipment would be added to handle additional electrical loads.

System and Structural Considerations

All three East Entrance locations will require upgrades to CCTV, intrusion detection, smoke and fire detection, public address speakers, public information display systems, station kiosk modifications, and upgraded restrooms to comply with ADA standards. Structural considerations based on the existing site conditions are minimal; the proposed entrance location is currently a vacant lot and each of the design options connects to the existing East Mezzanine knockout panel. However, structural design of the new entrance will rely greatly on the developer's site plans and will need to address adjacent building designs. WMATA will need to coordinate with the developer for studies during the joint development process.

6. Simulation Modeling of Build Alternatives

The Build Alternative simulation was developed to evaluate the benefits of proposed station improvements. Two Build Alternatives were developed to test the different second East Entrance locations and East Mezzanine improvement options. Each Build Alternative tests station access by way of a new complete station entrance or elevator only entrance, as well as some of the internal station improvements developed in the East Mezzanine improvement options[1].

The Build Alternative simulations include:

- **Build 2025, Alternative 1 –** A new complete station entrance is located on the corner of New Jersey Avenue and M Street, SE, with the station entrance facing New Jersey Avenue, SE (Entrance Location 1). East Mezzanine improvements include the extended East Mezzanine with new platform-to-mezzanine stair, new platform-to-mezzanine escalator, relocated platform-to-mezzanine elevator, and a new platform-to-mezzanine elevator.

- **Build 2025, Alternative 2** – Three new mezzanine-to-street elevators, facing M Street, SE, connect the East Mezzanine to the street (Entrance Location 2). East Mezzanine Improvements are the same as Build 2025, Alternative 1, but also include a relocated station kiosk, relocated ADA faregate, and two new standard faregates.)

Although Entrance Location 3 also features a complete station entrance, it was not modeled as part of the Build 2025 Alternatives. **Table 9** identifies the design options included in each of the Build Alternatives. **Figure 25** and **Figure 26** show the improvements included in each Build Alternative within the station.

[1] Platform-to-Mezzanine elevator operations were not analyzed as part of the study as elevator usage provides minimal impact to passenger movement. The orientation of these elevators in the Build Alternatives is for illustrative purposes only.

Table 9: Summary of Design Improvement Concepts per Build Alternative

Design Improvement Concept	Build 2025, Alternative 1	Build 2025, Alternative 2
New Station Entrance		
New Passageway	✓	✓
New Escalators	✓ (2 escalators)	
New Stair	✓	
New Elevators	✓ (2 elevators)	✓ (3 elevators)
Emergency Escape Stair		✓
East Mezzanine Improvements		
Extended East Mezzanine	✓	✓
New Escalator	✓	✓
New Stair	✓	✓
New Elevator	✓	✓
Relocated Existing Elevator	✓	✓
Relocated Station Kiosk		✓
New Faregates		✓ (2 faregates)
Relocated ADA Faregate		✓

Figure 25: Build 2025, Alternative 1 – New Complete Station Entrance

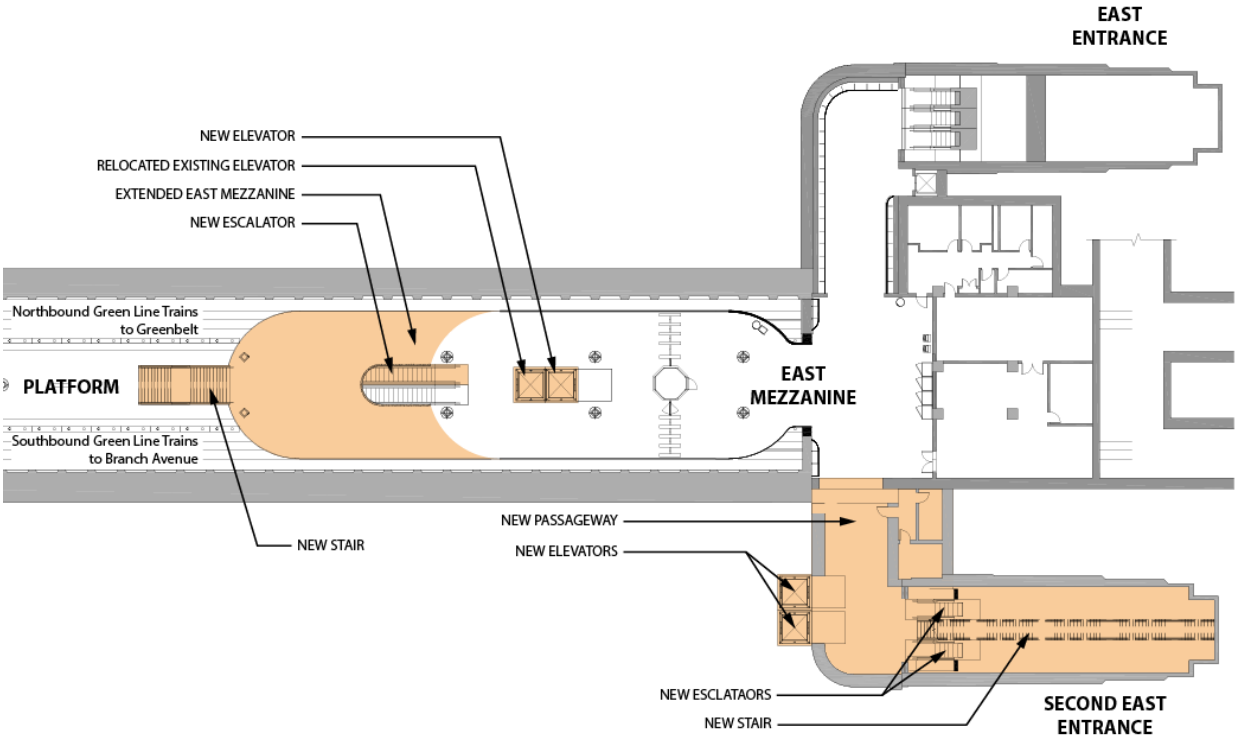
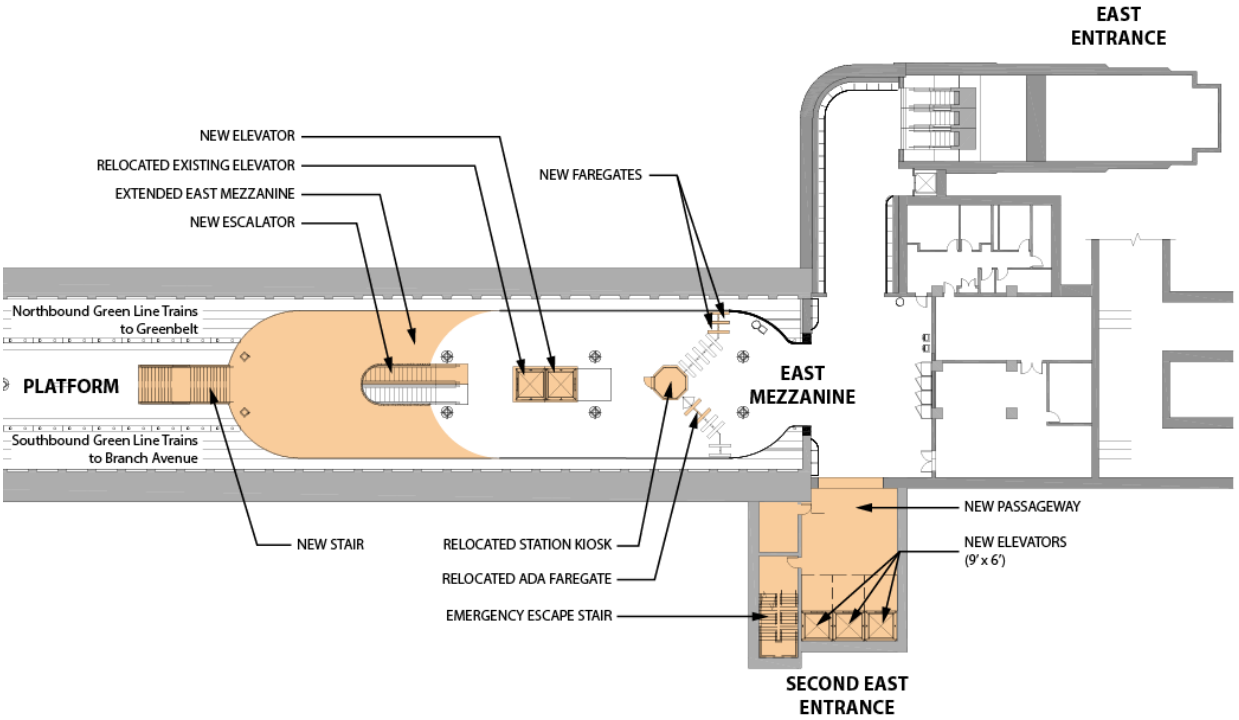


Figure 26: Build 2025, Alternative 2 – New Elevator Only Station Entrance



6.1 Methodology

The Build 2025 pedestrian simulation model uses the same methodology and Metrorail train operations as described in **Section 3.1** for the No Build 2025 simulation. The following sections below describe specific components of the Build 2025 pedestrian simulation model:

Ridership

For the Build 2025 simulations, the study assumed the same Metrorail boardings and alightings as the No Build 2025 simulation (see **Appendix A**), but adjusted the distribution of East Entrance entries and exits to account for the new East Entrance:

- **Build 2025, Alternative 1 –** East Entrance entries and exits were split evenly between the existing and new East Entrances for East Mezzanine passenger traffic (50% of passengers to each exit) during peak hours. This assumes that passengers would be equally likely to use either complete station entrance when entering/exiting the station.

- **Build 2025, Alternative 2** – East Entrance entries and exits were not split evenly, using the existing elevator configuration at Rosslyn Metrorail station elevators as a model to determine the split and configuration[2]. Elevators generally attract fewer users compared to complete entrances. Using this model, passengers were split 29% and 71% between the Second and existing East Entrance, respectively, during AM exits, and split 21% and 79% between the Second and existing East Entrance, respectively, during PM entries.

Table 10 below shows the number of total entries and exits during the AM peak 15 minutes at the station (using both the East and West Entrances), for both of the Build Alternatives. Refer back to **Table 5** to compare with the total entries and exits for the Existing Conditions and No Build 2025 simulation.

Table 10: AM Peak 15 Minutes Station Entries and Exits – Build 2025 Alternatives

	Build 2025, Alternative 1			Build 2025, Alternative 2		
	East Entrance	New East Entrance	West Entrance	East Entrance	New East Entrance	West Entrance
Entries	70	70	125	55	15	125
Exits	307	307	263	218	89	263

Source: October WMATA Faregate Data for Existing Condition, MWCOG 2.3 version 57 (Travel Demand Model) with Round 8.3 Cooperative Land Use Forecast Data for No Build 2025 simulation.

[2] The Rosslyn Metrorail station features three 6' x 9' elevators, measuring 54 ft^2 each, and assumes 2.5 ft^2 per passenger (rush hour crush load), 21 passengers per elevator, and 63 passengers per one complete elevator cycle (90 seconds).

6.2 Build Alternative Simulation Results by Measures of Effectiveness (MOEs)

Detailed MOE results for the Build Alternative simulations are reported below for the following:

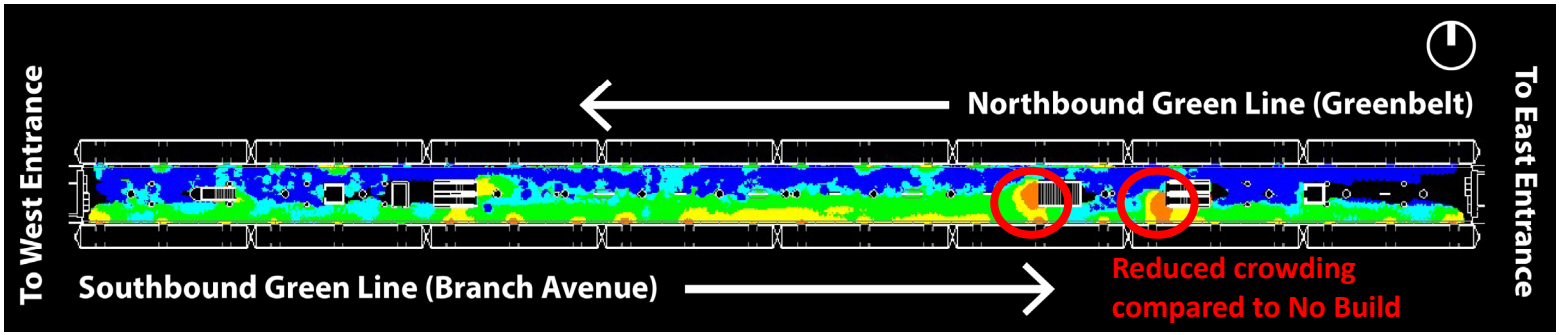
1. **Pedestrian LOS for Passageways (AM peak 15 minutes)**
2. **Alighting Journey Time (AM peak)**
3. **VCE Queue Clearance time (AM peak 15 minutes)**

Pedestrian LOS for Passageways (AM Peak 15 Minutes)

Figure 27 and **Figure 28** illustrate the LOS for the AM peak 15 minutes at the Platform and mezzanines for the Build 2025 simulations (Alternatives 1 and 2), respectively. Areas of LOS E and F (significant congestion) are highlighted on both figures. As with the No Build Simulation, no significant congestion occurs during the PM peak 15 minutes during either Build 2025 simulation. Refer back to **Figure 14** and **Figure 15** in **Section 3.3** to view the Pedestrian LOS for Passageways maps for both the Existing Conditions and No Build 2025 simulations.

Figure 27: AM Peak 15 Minutes Pedestrian LOS for Passageways – Platform Level (Build 2025, Alternatives 1 and 2)

Build 2025, Alternative 1



Build 2025, Alternative 2

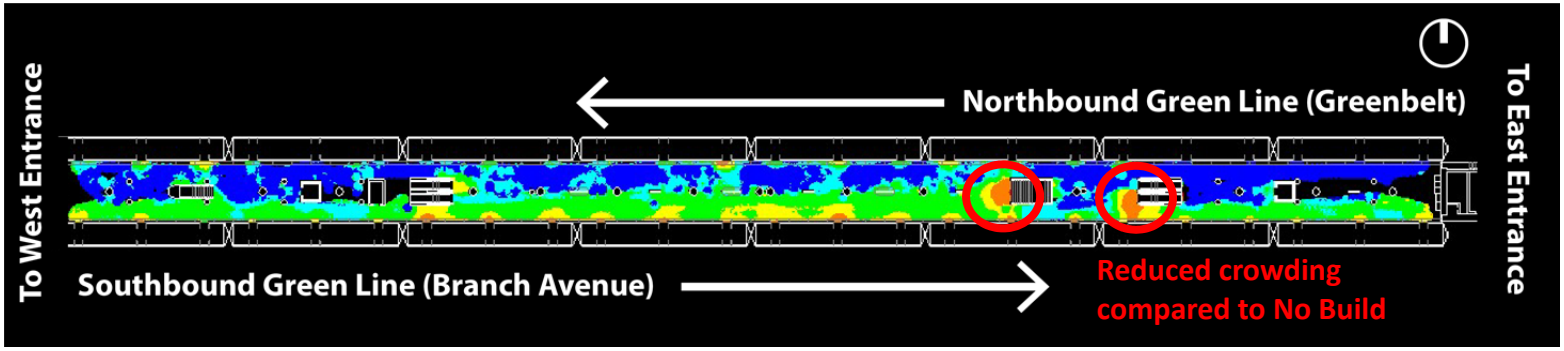
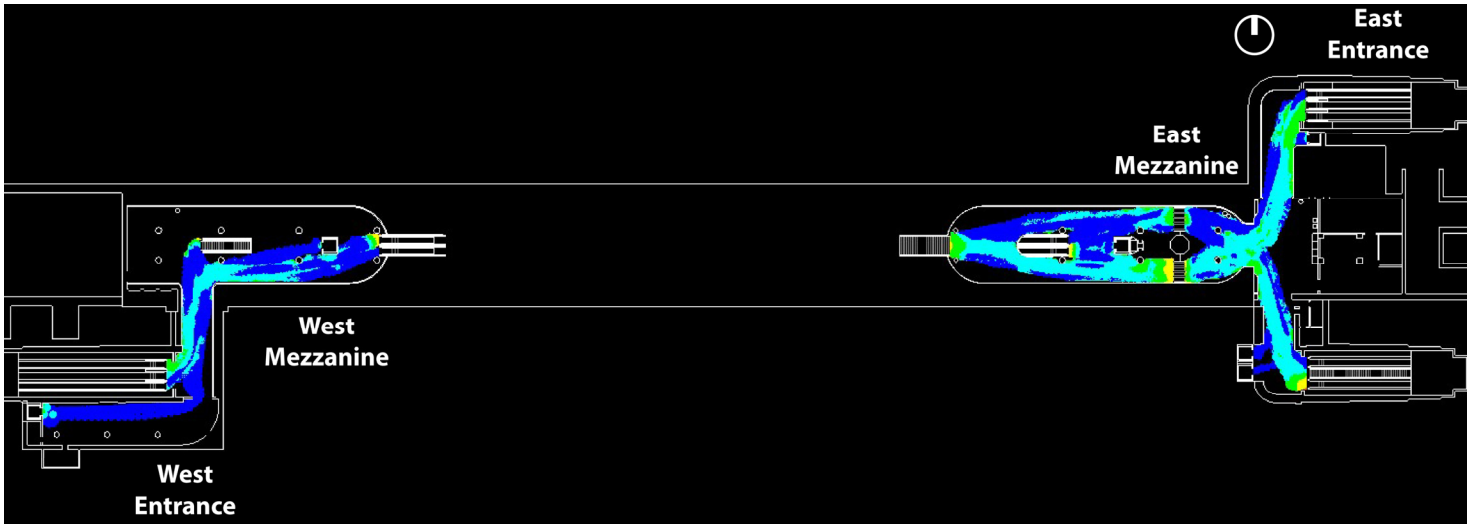
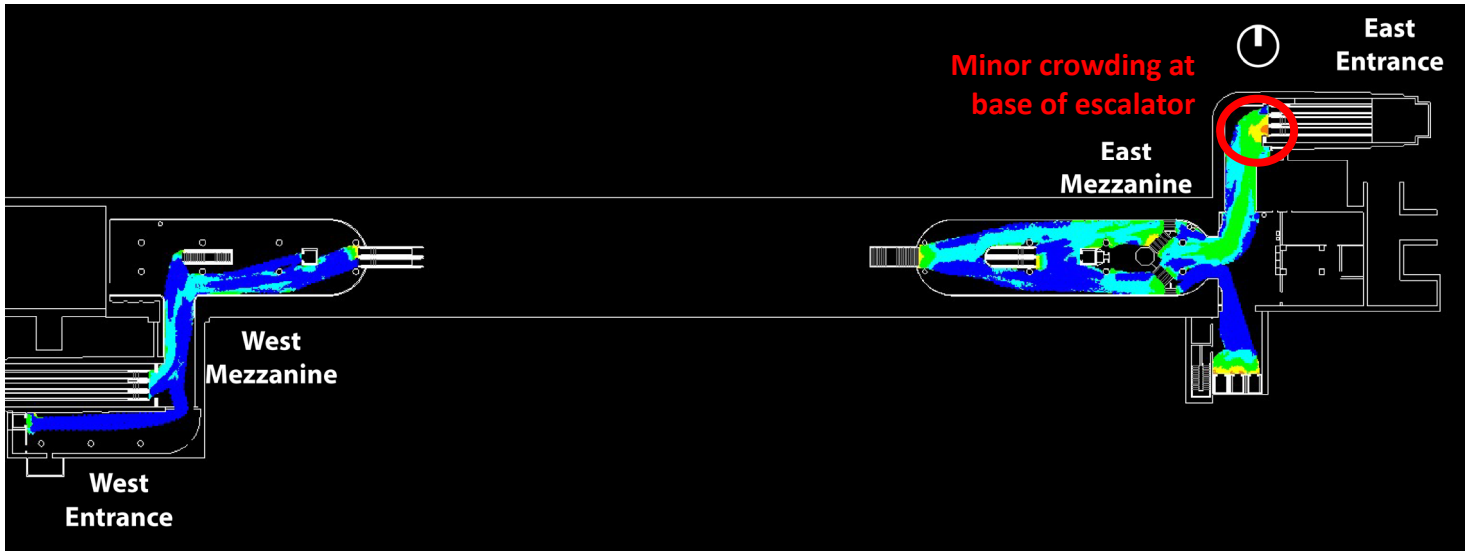


Figure 28: AM Peak 15 Minutes Pedestrian LOS for Passageways – Mezzanine Level (Build 2025, Alternatives 1 and 2)

Build 2025, Alternative 1



Build 2025, Alternative 2



Build 2025 Alternative 1 Density Map Comparison

During the AM peak 15 minutes, the additional VCE between the Platform and the East Mezzanine (**Figure 27**) moderately reduces Platform congestion from the No Build 2025 simulation. However, minor queuing occurs at the East Mezzanine faregate array due to the additional flow from the Platform. Additional VCEs (via the new East Entrance) between the East Mezzanine and street level provide increased capacity access to the station, resulting in the mezzanine area performing within the recommended threshold (**Figure 28**).

Build 2025 Alternative 2 Density Map Comparison

During the AM peak 15 minutes, the additional VCE between the Platform and the East Mezzanine (**Figure 28**) moderately reduces Platform congestion from the No Build 2025 simulation. However, the additional faregate array flow at the East Mezzanine results in minor queuing at the base of the existing escalators leading from the East Mezzanine to the existing East Entrance (**Figure 28**).

Zone Analysis Densities

The following pages summarize the density analysis results for Navy Yard-Ballpark station. **Figure 29** depicts the analysis zones of key pedestrian circulation areas used for calculating the percentages of passengers in LOS E and F from the simulations. **Table 11** lists the average LOS E and F during the AM peak period.

Figure 29: Navy Yard Pedestrian Density Analysis Zones

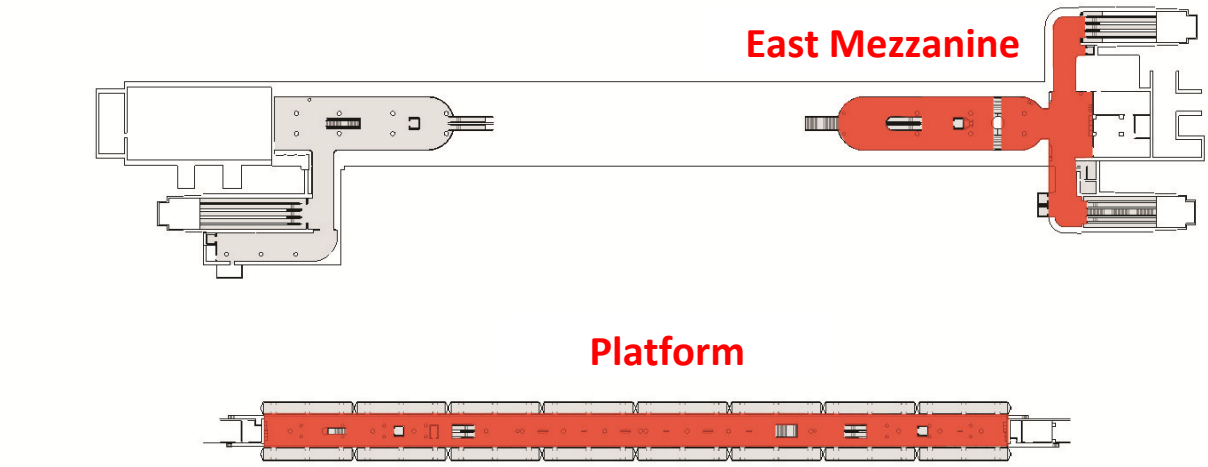


Table 11: AM Peak Hour % Combined LOS E and F – Existing Conditions, No Build 2025, and Build 2025

	East Mezzanine		Platform	
	Peak Hour	Peak 15 Minutes	Peak Hour	Peak 15 Minutes
Existing Conditions	0	0	3	7
No Build 2025	1	2	13	**22**
Build 2025, Alternative 1	1	2	4	8
Build 2025, Alternative 2	2	4	4	9

Both Build 2025 Alternatives greatly reduce amount of space on the Platform experiencing combined LOS E & F, reducing it from 22% during the peak 15 minutes to 8 and 9% for Build 2025 Alternatives 1 and 2, respectively, and completely eliminating any spaces experiencing LOS F.

Alighting Passenger Journey Time (AM Peak)

Table 12 shows the alighting journey time for passengers traveling from the Platform to the street level via either the existing or second East Entrance during the AM peak.

Table 12: Alighting Passenger Journey Time (AM Peak) – Existing Conditions, No Build 2025, and Build 2025

	Platform to Existing East Entrance (Minutes: Seconds)		Platform to New East Entrance (Minutes: Seconds)	
	Peak Hour	Peak 15 Minutes	Peak Hour	Peak 15 Minutes
Existing Conditions	2:42	2:47	-	-
No Build 2025	3:06	**3:31**	-	-
Build 2025, Alternative 1	2:55	3:01	2:50	2:56
Build 2025, Alternative 2	3:00	3:04	**3:25**	**3:30**

Both Build 2025 Alternatives improve the passenger journey time from the Platform to the existing East Entrance compared to the No Build 2025 simulation, in particular during the peak 15 minutes between the No Build and Build Alternative 1, in which passenger journey time is reduced by 30 seconds. However, both Build 2025 Alternatives have a longer passenger journey time compared to the Existing Conditions, both during the peak hour and peak 15 minutes. In addition, the Build 2025, Alternative 2 journey time from the Platform to the new East Entrance is more than 30 seconds longer compared to Build 2025, Alternative 1.

VCE Queue Clearance Time (AM Peak 15 Minutes)

The busiest VCEs were analyzed to determine the resulting queue clearance times for the Existing Conditions, No Build, and Build 2025 simulations; other VCEs that were viewed to have no significant queuing during the peak hours were excluded from the detailed analysis. **Table 13** lists the VCEs selected for further analysis. **Figure 30** identifies the location of each of the VCEs selected for further analysis. **Table 14** lists the average VCE queue clearance times (recorded in minutes:seconds) derived from the simulations.

Table 13: VCEs Selected for Queue Clearance Time Analysis

VCE No.	Existing/New	Location	Type	Direction
1	Existing	Platform to East Mezzanine	Escalator	Up
2	Existing	East Mezzanine to Street (East Entrance)	Escalator	Up
3	New	Platform to East Mezzanine	Stairs	Up
4	New	East Mezzanine to Street (New East Entrance)	Escalator/Stair	Up

Figure 30: Location of Selected VCEs within Navy Yard-Ballpark Station (Build 2025, Alternative 1)

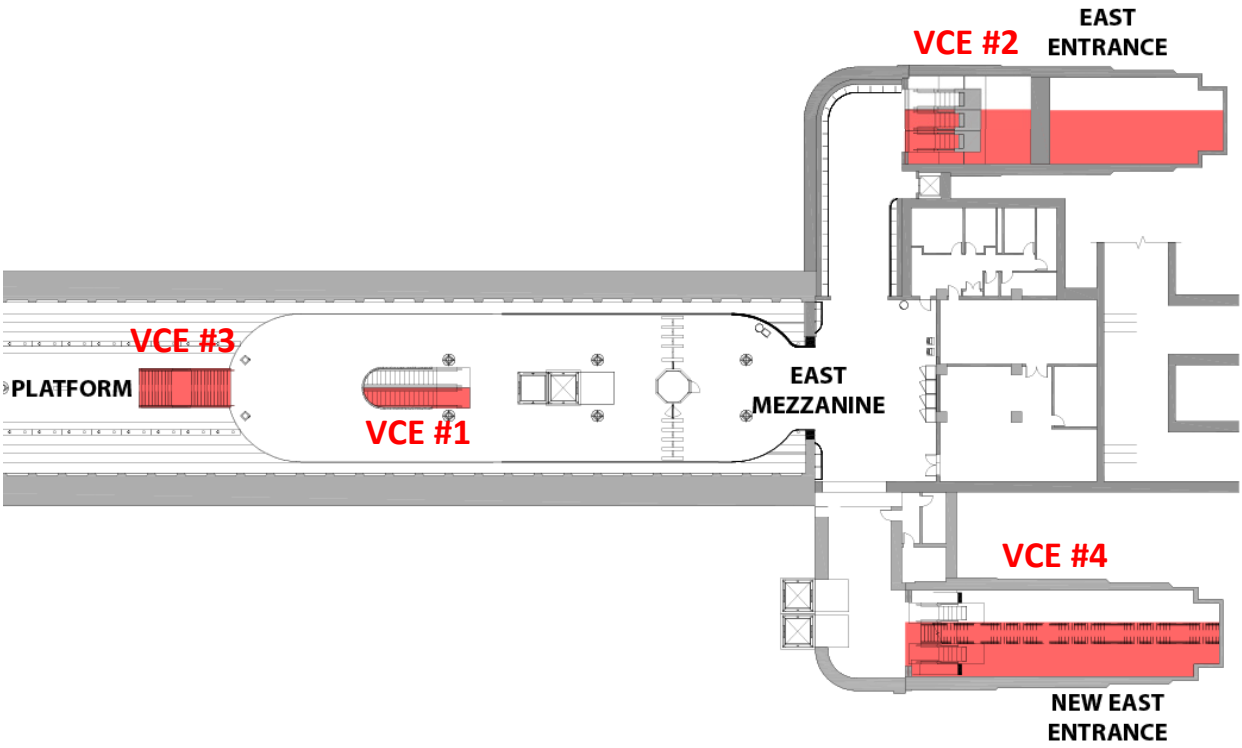


Table 14: Average AM Peak 15 Minutes VCE Clearance Time – Existing Conditions, No Build 2025, and Build 2025

	VCE #1 (Existing) (Minutes: Seconds)	VCE #2 (Existing) (Minutes: Seconds)	VCE #3 (New) (Minutes: Seconds)	VCE #4 (New) (Minutes: Seconds)
Existing Conditions	1:03	No Queue	N/A*	N/A*
No Build 2025	**2:41**	No Queue	N/A*	N/A*
Build 2025, Alternative 1	0:37	No Queue	0:37	No Queue
Build 2025, Alternative 2	0:37	No Queue	0:37	N/A†

**VCE not included as part of the Existing Conditions or No Build simulations.*

†Mezzanine to Street Elevators for Build 2025, Alternative 2 were not selected for VCE Queue Clearance Time Analysis

The addition of VCE #3 in both Build 2025 Alternatives helps to reduce the queue clearance time at the base of VCE #1. For both Build 2025 Alternatives, the queue clearance time for VCE #1 is reduced by 26 seconds compared to the Existing Conditions, and reduced by 2 minutes and 4 seconds compared to the No Build 2025 simulation.

6.3 Summary of Build 2025 Simulations

The Build 2025 simulations yielded the following results:

- **Reduced Platform Congestion -** Platform congestion is reduced from 22% combined LOS E & F in the No Build 2025 simulation to between 8% and 9% in Build 2025, Alternatives 1 and 2, respectively.

- **Minimal Impact on Alighting Passenger Journey Time –** The addition of a new complete station entrance in Build 2025, Alternative 1 reduced alighting passenger journey time by way of the existing East Entrance by as much as 30 seconds compared to the No Build during the AM peak 15 minutes, but was still longer compared to the same trip during the Existing Conditions for both the AM peak hour and 15 minutes. The new elevator-only entrance in Build 2025, Alternative 2 yielded marginal travel time saving benefits for the existing East Entrance compared to the No Build 2025 simulation, and also created long queues at the Second East Entrance.

- **Reduced Platform to Mezzanine VCE Queue Clearance Time –** The new platform-to-East Mezzanine VCEs helped to reduce queuing by as much as just over 2 minutes at the base of the existing platform-to-East Mezzanine escalator in the Build 2025 Alternatives compared to both the Existing Conditions and No Build 2025 simulation.

- **Reduced Safety Concerns –** The simulated decreases in Platform congestion and queue clearance time for platform-to-mezzanine VCEs indicate safer conditions along the Platform and near train loading/unloading areas. As a result, the increased internal infrastructure is better equipped to handle the simulated increase in passenger traffic.

7. Conceptual Capital Cost Estimates

This section summarizes the conceptual capital cost estimates for each of the East Mezzanine improvements (Options 1A and 1B) as well as new East Entrance Locations 1 and 2. Cost estimates are also included for a station entrance canopy to be used for a free standing complete station entrance.

Conceptual capital cost estimates were developed based on WMATA specifications and industry practices. Construction costs are based on current year dollars. No escalation or year-of-expenditure costs are included. Professional Services are assumed to be 30% of construction costs. Unallocated contingency is assumed to be 10%. Construction costs also include allocated contingencies, contractor mark-up, profit, sales tax, subcontractor mark-ups, and current Washington DC Davis-Bacon labor rates.

Cost estimates were not prepared for new East Entrance Location 3, but the anticipated cost is comparable new East Entrance Location 1, which also calls for a complete entrance.

Table 15 summarizes the estimated construction and total project costs. **Table 16** summarizes the excavation portion only. The complete cost estimate is provided in **Appendix G**.

Table 15: Conceptual Capital Cost Estimate Summary

	Construction Total	Professional Services Cost	Unallocated Contingency	Total Project Cost
Second East Entrance: Entrance Location 1 (Complete) **(Figure 26)**	$10,700,000	$3,210,000	$1,391,000	**$15,301,000**
Second East Entrance: Entrance Location 2 (Elevator Only) **(Figure 27)**	$6,700,000	$2,010,000	$871,000	**$9,581,000**
Station Entrance Canopy	$ 1,800,000	$540,000	$234,000	**$2,574,000***
East Mezzanine Improvements: Option 1A (Mezzanine Extension; one additional elevator) **(Figure 22, Top)**	$10,400,000	$3,120,000	$ 1,352,000	**$14,872,000**
East Mezzanine Improvements: Option 1B (Mezzanine Extension; one additional elevator and one relocated elevator and kiosk) **(Figure 22, Bottom)**	$12,500,000	$3,750,000	$1,625,000	**$17,875,000**

**Station Entrance Canopy only applies to Entrance Location 1, not needed if new entrance is included in building envelope.*

Table 16: Conceptual Capital Cost Estimate Summary – Excavation Portion Only

	Construction Total	Professional Services Cost	Unallocated Contingency	Total Project Cost
Second East Entrance: Entrance Location 1 (Complete) **(Figure 26)**	$10,700,000	$3,210,000	$1,391,000	**$15,301,000**
Second East Entrance: Entrance Location 2 (Elevator Only) **(Figure 27)**	$6,700,000	$2,010,000	$871,000	**$9,581,000**

Typical contract costs for excavation include utility relocation, support of excavation (SOE), excavation, dewatering, concrete shell, waterproofing, fencing, and quality control and assurance. For planning purposes, the excavation costs minus the concrete shell would be $7,436,000 for Entrance Location 1 and $4,433,000 for Entrance Location 2.

8. Evaluation of Design Options

This section summarizes the evaluation criteria and measures used to evaluate each of the East Mezzanine improvement options as well as the new East Entrance locations. The design options were evaluated based on the degree to which they would achieve the study's design objectives as described in **Section 4.1**, informed by the results of the Build 2025 Alternative simulation results in **Section 6.2**.

Table 17 below outlines the general evaluation criteria and specific evaluation measures developed for the design objectives.

Table 18 and **Table 19** summarize the evaluation results for the design options:

- East Mezzanine Improvements: Option 1A and 1B
- Second East Entrance: Entrance Locations 1, 2, and 3

Table 17: Design Objectives and Corresponding Evaluation Criteria and Measures

Design Objectives	Evaluation Criteria	Evaluation Measures
1. Reduce crowding and improve passenger flows within the station.	Internal Station Performance	High Level Comparison of No Build and Build 2025 Pedestrian Simulation Modeling Results
2. Guide timely future development and support Capital Riverfront neighborhood vision.	Station Access	Comparison of Entrance Options
	Visual Impacts	Responsiveness to Developer and Neighborhood Vision
3. Minimize construction impacts and provide cost effective solutions.	Construction Cost and Feasibility	Conceptual Capital Cost • Order-of-Magnitude capital costs • Constructability • Potential architectural/engineering constraints

Table 18: East Mezzanine Improvements: Options 1A and 1B

Evaluation Measures	Summary Findings
Internal Station Performance	
Comparison of No Build and Build 2025 Pedestrian Simulation Modeling	• Significantly reduces overall Platform congestion, particularly during AM peak 15 minutes. • Helps to separate boarding and alighting passengers by providing additional Platform egress points and an extended mezzanine. • Reduces queues at existing platform-to-mezzanine VCEs. • Second platform-to-mezzanine elevator provides alternate entry/egress path in case of mechanical breakdown (redundancy). • Improves overall safety along the Platform.
Station Access	
Comparison of Entrance Options	No impact on location of Second East Entrance.
Visual Impacts	
Responsiveness to Developer and Neighborhood Vision	No impact on developer and neighborhood vision.
Engineering Cost and Feasibility	
Order of Magnitude Capital Cost	• **Option 1A** – $14.9 M • **Option 1B** – $17.9 M
Potential Architectural/ Engineering Constraints	• No room presently to include two additional faregates. • Further study needed to ensure no engineering constraints/problems in relocating station kiosk and installing new elevator (**Option 1B** only). • Space between kiosk door, new elevator, and faregates is too cramped; does not allow passengers to easily access station manager from paid area (**Option 1B** only).

Table 19: Second East Entrance: Locations 1, 2, and 3

Evaluation Measures	Summary Findings		
	Entrance Location 1	Entrance Location 2	Entrance Location 3
Internal Station Performance			
Comparison of No Build and Build 2025 Pedestrian Simulation Modeling	• Reduces alighting journey time compared to No Build 2025. • Does not reduce alighting journey time compared to the Existing Conditions. • No effect on reducing VCE queues from the East Mezzanine to the street level.	• Slightly increases crowding at base of escalators at the existing East Entrance during the AM peak 15 mins compared to No Build 2025. • Does not improve alighting journey time during the AM peak hour or 15 minutes compared to No Build 2025. • No effect on reducing VCE queues from the East Mezzanine to the street level.	Same as Entrance Location 1.
Station Access			
Comparison of Entrance Options	• Provides an additional complete station entrance (including an additional ADA pathway) for passengers entering and exiting the station to and from points east. • Allows for more direct access to USDOT and the riverfront.	• Provides an additional ADA pathway for passengers entering and exiting the station to and from points east. • Potential conflict with proposed elevators facing existing station vents, option exists for elevator entrance to face away from station vents.	• Provides an additional complete station entrance (including an additional ADA pathway) for passengers entering and exiting the station. • Directs passengers towards Nationals Park.

Evaluation Measures	Summary Findings		
	Entrance Location 1	Entrance Location 2	Entrance Location 3
Visual Impacts			
Responsiveness to Developer and Neighborhood Vision	• Station entrance canopy discouraged as it would block viewsheds along New Jersey Avenue, SE. • Corner entrance location would displace desirable retail opportunity for proposed PUD.	• Mid-block location does not displace corner real estate or overlap with New Jersey Avenue, SE viewshed. • Smaller footprint allows for easier inclusion into proposed PUD.	• Station canopy (if needed) would not block existing viewsheds along New Jersey Avenue, SE or M Street, SE. • New entrance would not displace corner retail opportunity for proposed PUD.
Engineering Cost and Feasibility			
Order of Magnitude Capital Cost	$36 - $38.6 M (without and with station entrance canopy).	$22.2 M.	$36 - $38.6 M (without and with station entrance canopy).
Potential Architectural/ Engineering Constraints	• Design will rely greatly on developer plans for the site. • New escalator control rooms and new elevator machine rooms required. • General electrical and mechanical upgrades required, refer to the Engineering Scan (**Appendix D**).	• Design will rely greatly on developer plans for the site. • New elevator machine rooms required. • General electrical and mechanical upgrades required, refer to the Engineering Scan (**Appendix D**).	Same as Entrance Location 1.

9. Conclusions and Next Steps

This section discusses the overall conclusions based on the findings of this report, as well as the next steps and future considerations for further study relating to the Navy Yard-Ballpark Metrorail station.

9.1 Conclusions

By 2025, the station will experience increased passenger congestion based on Metrorail passenger forecasts, pedestrian simulation models, and projected future development within the Capital Riverfront neighborhood. To accommodate the increase in station activity, internal station improvements at the East Mezzanine are needed. Implementation of the East Mezzanine improvements (either Option 1A or 1B) will improve internal passenger conditions and should be the primary focus of any capital improvements proposed for the station.

A second East Entrance, while helpful in providing an additional entry and egress point for passengers, is not a priority capacity investment. However, should WMATA wish to include a new station entrance as part of its future plans, coordination between WMATA and the developer will be necessary.

East Mezzanine Improvements

The East Mezzanine Improvements provide the greatest relief to Platform congestion and reducing VCE queues within the station:

- **East Mezzanine Extension -** Provides the greatest relief to Platform congestion and reducing platform-to-mezzanine VCE queues. The additional space separates boarding and alighting passengers, reducing LOS E & F on the Platform in the Build 2025 simulation compared to the No Build 2025 simulation.

- **Additional Platform to Mezzanine VCEs –** Reduces queuing at the existing platform-to-mezzanine escalator without creating additional queues. Also allows for more passengers to exit the Platform, reducing overall congestion and improving safety.

- **New Faregates -** Additional faregates at the East Mezzanine are not necessary. However, new faregates would allow for increased passenger capacity and mitigate congestion caused by an out-of-service faregate.

Second East Entrance

Each of the second East Entrance locations demonstrates unique strengths and weaknesses:

- **Entrance Location 1 (Complete Station Entrance, facing New Jersey Avenue, SE**) – Provides a highly-visible complete station entrance with direct access towards points east (including the Navy Yard and USDOT). However, Location 1 removes a valuable retail opportunity for the developer and is the most expensive location to build (along with Location 3).

- **Entrance Location 2 (Elevator-Only Option, midblock of M Street, SE) –** Is the least expensive location to construct construct and preserves the corner retail opportunity at New Jersey Avenue, SE and M Street, SE. However, Location 2 lacks high pedestrian visibility and would not attract as many passengers as a complete station entrance, potentially increasing congestion at the mezzanine level of the existing East Entrance.

- **Entrance Location 3 (Complete Station Entrance, midblock of M Street, SE)** - Provides a complete station entrance and preserves the corner retail opportunity at New Jersey Avenue, SE and M Street, SE. However, Location 3 is lacks high pedestrian visibility, does not provide direct access to points east (including the Navy Yard and USDOT) and is the most expensive location (along with Location 1).

9.2 Next Steps

Further Architectural Analysis for new East Mezzanine Faregate

Based on simulation results, a new East Mezzanine faregate is not necessary, but recommended to mitigate passenger congestion caused by an out-of-service faregate. Presently, the spatial configuration of the East Mezzanine prevents the installation of additional faregates at the faregate array. Further study would be needed to determine how the East Mezzanine could be modified to accommodate an additional standard faregate.

Timely Coordination with Developer Regarding New Entrance Location

Other entrance configurations and locations may provide benefits to passengers entering and exiting the station via the East Mezzanine, as well as the surrounding neighborhood and future development. It is important that timely coordination with the developer be carried out as soon as possible determine the optimal orientation for mezzanine-to-street elevators for passengers entering and exiting at the street level, ensuring that elevators will fit seamlessly into the developer's proposed long-term plans. Furthermore, a new entrance south of East Entrance Locations 1, 2, and 3 could be considered as an alternative to provide a more direct connection with the Anacostia River and promote future riverfront redevelopment. Further study would be needed to determine the new entrance's design, feasibility, and cost.

Appendices

Appendix A: Distribution of Station Entries and Exits for Existing Conditions, No Build 2025, and Build 2025 Simulations

Distribution of Station Entries and Exits for Existing Conditions, No Build 2025, and Build 2025 Simulations

	Existing Conditions		No Build 2025		Build 2025, Alternative 1		Build 2025, Alternative 2	
	AM Exits/ PM Entries	AM Entries/ PM Exits	AM Exits/ PM Entries	AM Entries/ PM Exits	AM Exits/ PM Entries	AM Entries/ PM Exits	AM Exits/ PM Entries	AM Entries/ PM Exits
East Entrance	82%	64%	70%	53%	35%	26.5%	50%	42%
Second East Entrance	-	-	-	-	35%	26.5%	20%	11%
West Entrance	18%	36%	30%	47%	30%	47%	30%	47%

Source: October 2014 WMATA Faregate Data for Existing Conditions, For the No Build 20A25 distribution, 2025 TAZ Data for the No Build 2025 simulation.

Peak Hour Station Entries and Exits for Existing Conditions, No Build 2025

	Existing Conditions				No Build 2025			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	East Entrance	West Entrance	East Entrance	West Entrance	East Entrance	West Entrance	East Entrance	West Entrance
Entries	252	159	1,032	234	519	461	2,129	912
Exits	1,027	213	216	97	2,267	971	536	478

Source: October WMATA Faregate Data for Existing Condition, MWCOG 2.3 version 57 (Travel Demand Model) with Round 8.3 Cooperative Land Use Forecast Data for No Build 2025 simulation.

Peak Hour Station Entries and Exits for Build 2025 Alternatives

	Build 2025, Alternative 1						Build 2025, Alternative 2					
	AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
	East Ent.	Second East Ent.	West Ent.	East Ent.	Second East Ent.	West Ent.	East Ent.	Second East Ent.	West Ent.	East Ent.	Second East Ent.	West Ent.
Entries	259	260	461	1,064	1,065	912	410	109	461	1,512	617	912
Exits	1,133	1,134	971	268	268	478	1,610	657	971	424	112	478

Source: Based on Pedestrian Observation Data and Simulation Forecast Modeling, AECOM

Appendix B: Existing and Future Metrorail Operating Plan

Metrorail Operating Service Plans: 2014 and 2018

Origin	Destination	2014 (Silver Phase I)		2018 & Beyond (Silver Phase II)		Route Name
		Peak	Off Peak	Peak	Off Peak	
		Headway				
Shady Grove	Glenmont	6	12	6	12	WMREDA
Grosvenor	Silver Spring	6	12	6	12	WMREDB
Greenbelt	Branch	6	12	6	12	WMGRNA
Mt. Vernon Sq. -UDC (peak only)	Huntington	6	--	6	--	WMYELA (Peak)
Ft. Totten (off peak only)	Huntington	--	12	--	12	WMYELA (Off Peak)
Franconia-Springfield	Largo	12	12	12	12	WMBLUA
Franconia-Springfield	Greenbelt	12	--	12	--	WMYELB (Peak)
Vienna	New Carrollton	6	12	6	12	WMORN
Dulles Greenway	Largo	--	--	6	12	WMSILV
Wiehle Ave	Largo	6	12	--	--	WMSILV

Appendix C: Faregate Capacity Analysis

No Build 2025 AM Peak Hour Analysis – East Mezzanine (East Entrance)

Criteria	Output and Unit	Methodology
Design Capacity of Each Faregate per Minute (Worst Case Scenario)	35 Passengers/minute	A
Exits Flow	215 Passengers/minute	B
Faregates Required for Exits (minimum = 1)	7 Gates	C = A/B
Entry Flow	9 Passengers/minute	D
Faregates Required for Entries	1 Gate	E = D/A
ADA Gate (minimum = 1 per array)	1 Gate	F
Redundant Gate (minimum = 1 per array)	1 Gate	G
Total Faregates Required	**10 Gates**	**H = C+E+F+G**
Faregates Provided	**8 Gates** (**queue**)	**I**

No Build 2025 AM Peak Hour Analysis – West Mezzanine (West Entrance)

Criteria	Output and Unit	Methodology
Design Capacity of Each Faregate per Minute (Worst Case Scenario)	35 Passengers/minute	A
Exits Flow	92 Passengers/minute	B
Faregates Required for Exits (minimum = 1)	3 Gates	C = A/B
Entry Flow	10 Passengers/minute	D
Faregates Required for Entries	1 Gate	E = D/A
ADA Gate (minimum = 1 per array)	1 Gate	F
Redundant Gate (minimum = 1 per array)	1 Gate	G
Total Faregates Required	**6 Gates**	**H = C+E+F+G**
Faregates Provided	**12 Gates** (**pass**)	**I**

No Build 2025 PM Peak Hour Analysis – East Mezzanine (East Entrance)

Criteria	Output and Unit	Methodology
Design Capacity of Each Faregate per Minute (Worst Case Scenario)	35 Passengers/minute	A
Exits Flow	47 Passengers/minute	B
Faregates Required for Exits (minimum = 1)	2 Gates	C = A/B
Entry Flow	37 Passengers/minute	D
Faregates Required for Entries	2 Gates	E = D/A
ADA Gate (minimum = 1 per array)	1 Gate	F
Redundant Gate (minimum = 1 per array)	1 Gate	G
Total Faregates Required	**6 Gates**	**H = C+E+F+G**
Faregates Provided	**8 Gates** (pass)	**I**

No Build 2025 PM Peak Hour Analysis – West Mezzanine (West Entrance)

Criteria	Output and Unit	Methodology
Design Capacity of Each Faregate per Minute (Worst Case Scenario)	35 Passengers/minute	A
Exits Flow	42 Passengers/minute	B
Faregates Required for Exits (minimum = 1)	2 Gates	C = A/B
Entry Flow	16 Passengers/minute	D
Faregates Required for Entries	1 Gate	E = D/A
ADA Gate (minimum = 1 per array)	1 Gate	F
Redundant Gate (minimum = 1 per array)	1 Gate	G
Total Faregates Required	**5 Gates**	**H = C+E+F+G**
Faregates Provided	**12 Gates** (pass)	**I**

Appendix D: Vertical Circulation Element (VCE) Capacity Analysis

No Build 2025 AM Peak Hour Analysis

Escalator Number and Direction	Location	Passenger Volume	Required Per Demand	Clearance Time (Seconds)	Result
E2 (Down)	West Mezzanine to Platform	5	1	0	OK
E3 (Up)	Platform to West Mezzanine	90	1	0	OK
E4 (Up)[1]	Platform to East Mezzanine	224	2	92	QUEUE

[1]Includes both escalator and stair demand (both directions)

No Build 2025 PM Peak Hour Analysis

Escalator Number and Direction	Location	Passenger Volume	Required Per Demand	Clearance Time (Seconds)	Result
E2 (Down)	West Mezzanine to Platform	8	1	0	OK
E3 (Up)	Platform to West Mezzanine	42	1	0	OK
E4 (Up)[1]	Platform to East Mezzanine	84	1	0	OK

[1]Includes both escalator and stair demand (both directions)

Appendix E: Detailed Engineering Scan

1. Purpose

This memorandum outlines the proposed entrance alternatives and provides an engineering assessment of the structural, electrical, and mechanical systems of the Navy Yard-Ballpark Metrorail station ("Navy Yard-Ballpark station" or "the station") in addition to existing street utilities at the proposed entrance locations.

2. Design Options

2.1 Entrance Location 1 – Complete Entrance Facing New Jersey Avenue, SE

Entrance Location 1 is located on the southwest corner of M Street, SE and New Jersey Avenue, SE, providing a mirror image of the existing entrance to the north. The proposed entrance includes two escalators and one stairway, which lead to the mezzanine level and connect at the existing knock out panel. The footprint of the additional underground walkway is minimal, limiting overall land disturbance. In addition to the escalator entrance, two elevators to the mezzanine would be added to comply with design standards. The east-facing elevators are located on M Street, SE in the corner of the proposed parcel limit.

2.2 Entrance Location 2 – Elevator Only Midblock Entrance Facing M Street, SE

Entrance Location 2 is an elevator-only option. This alternative includes three new elevators as well as an emergency stairway all located in the northwest corner of the proposed east parcel. The entrance at the corner of M Street, SE and First Street, SE opens to the north. The stairway and all three elevators will connect at the mezzanine level. This option has the smallest footprint due to the lack of escalators. The proposed passageway connects at the existing knockout panel.

2.3 Entrance Location 3 – Complete Midblock Entrance Along M Street, SE

Entrance Location 3 is located near the southeast corner of M Street, SE and First Street, SE and opens to the west. As with Entrance Location 1, this option is located in the same developable parcel and incorporates two escalators and one stairway. Two additional elevators would be included in the western-adjacent parcel, opening to the north on M Street, SE. All points of access connect at the mezzanine level. The underground passageway, which connects at the existing knockout panel, is slightly larger in this alternative and creates a larger combined footprint.

3. Existing Subsurface Utilities

Existing utility information was determined based on as-built records. There are multiple utility lines within the roadway that run parallel to M Street, SE as well as New Jersey Avenue, SE. These utilities

include storm drains, sanitary, gas, water, phone, and electric lines. Sizing varies greatly, from approximately 6 inches to 30 inches in diameter. Information regarding the depth of these utility lines would need to be investigated further.

Additionally, there are three large Metrorail vents adjacent to the sidewalk on the southern edge of M Street, SE near the corner of New Jersey Avenue, SE. One of these vents is located above where the knockout panel exists. From a survey of existing utilities, it does not appear that any other utilities exist at the knockout panel location. Farther east, and between two of the vents, there are two 12 inch water lines that run perpendicular across the sidewalk on M Street, SE.

None of the three proposed locations suggest serious utility complications. Each option is located outside of the air vent location, both horizontally and vertically. At this level of study it appears that the passageways could be created without interference or with minor modifications. In addition, the conflicting utility lines could most likely be relocated to accommodate construction. Further utility coordination will be required during the joint development process.

4. Mechanical Considerations

Elevators and escalators each require machinery rooms to house required electrical and mechanical equipment. These machinery rooms will contain electrical distribution equipment, fire detection, exhaust ventilation, intrusion detection and control at the kiosk. Entrance Locations 1 and 3 both require new escalator control rooms and all three locations require new elevator machine rooms.

Drainage will be required for elevators, escalators, and stairwells. Further consideration will be necessary to determine the feasibility of connection into the existing station drainage system or if a new connection to nearby storm drainage is necessary, which would require sump pumps.

The Navy Yard-Ballpark station is a below grade station which interconnects underground train ways on both ends of the station. The proposed new entrance may impact both the normal and emergency ventilation and further study should be provided to determine any impacts and mitigation.

5. Electrical Considerations

Electrical power will be required for the mechanical equipment, lighting, emergency lighting, and convenience receptacles. Power would be obtained from the existing AC switchboard rooms with electrical feeders installed in conduit to the new machine room electrical distribution equipment. Electrical work would include adding circuit breakers and evaluating the impact of additional loads on the existing normal and emergency (UPS) electrical equipment.

6. System Considerations

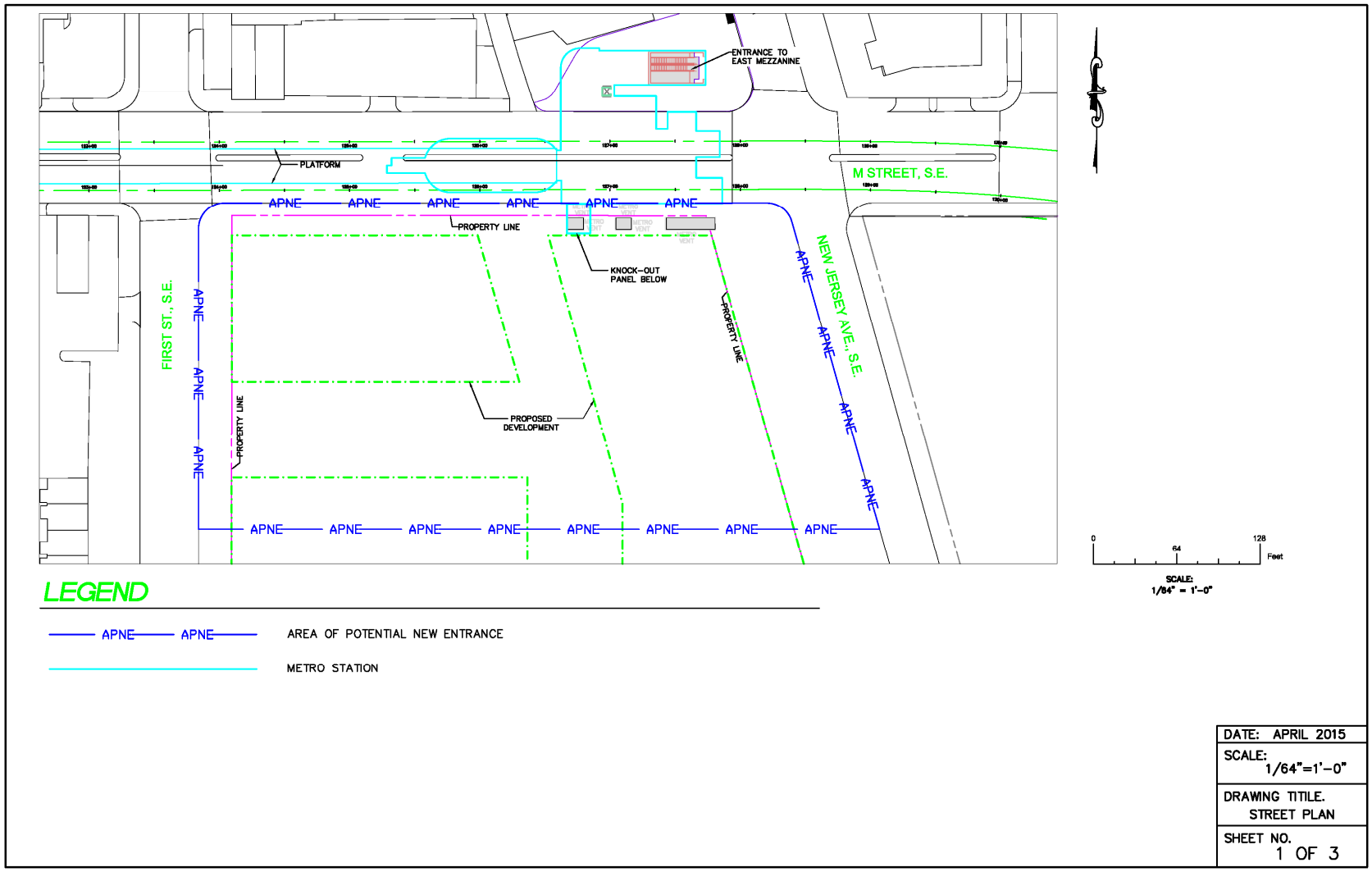
In addition to standard mechanical and electrical considerations, there are multiple new or revised components that each proposed alternative would require in order to function safely and efficiently. All alternatives will require the following:

- Closed Circuit Television (CCTV) cameras to monitor the proposed entrance area. Conduits and cables will be required between the CCTV cameras and the existing communications room.
- Intrusion detection will be required on the machinery room doors. Conduits and cables will be required between the sensors and the existing communication room.
- Smoke and fire detection will be required in the machinery rooms. Conduits and cables will be required between the detectors and the existing fire alarm panel.
- Public address speakers will be required in the proposed entrance area. Conduits and cables will be required between the detectors and the existing communication room.
- Public information display system (PIDS) should be considered for the proposed entrance area. Conduits and cables will be required between the detectors and the existing communication room.
- Station kiosk modifications will be required to accommodate the additional elevators, escalators, CCTV cameras, intrusion detection, and fire detection devices.
- Public restroom will need to be updated to comply with current ADA standards.

7. Structural Considerations

The current structural considerations are minimal due to the fact that the location of the proposed entrance is a demolished vacant lot. Each of the proposed new East Entrance Locations will connect to the existing station via the knock out panel, which also reduces structural restrictions. There is an existing slurry wall located adjacent to the knockout panel, which will need to be modified based on the extended passageway. However, structural considerations will arise, as the site is part of a development parcel and planned to be developed. The structural design will rely greatly on the developer's plans for the site. WMATA will need to coordinate with the developer for studies during the joint development process.

Appendix F: Existing Station Area Utility Site Plans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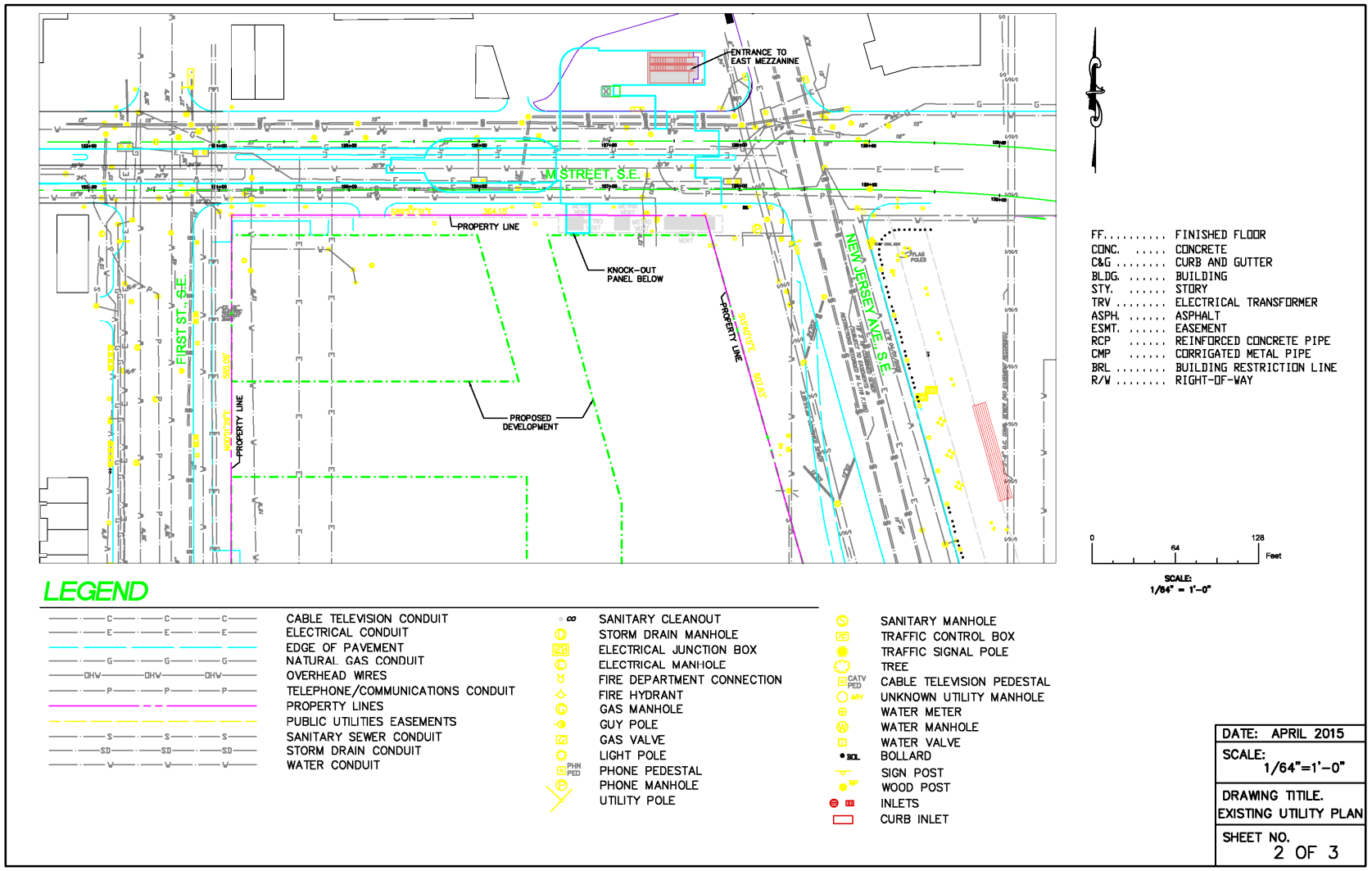
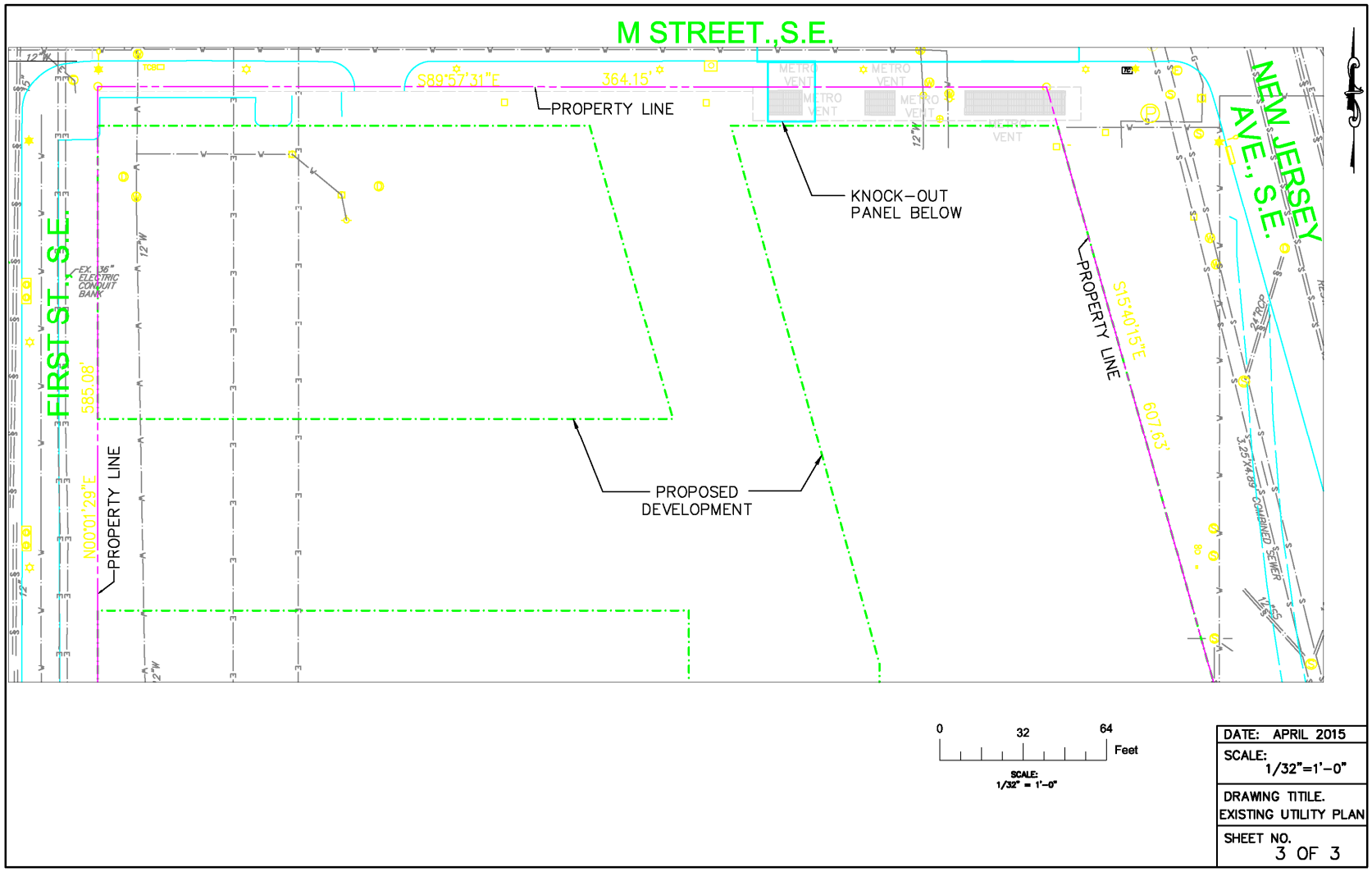
PLATFORM
M STREET, S.E.
APNE
PROPERTY LINE
KNOCK-OUT PANEL BELOW
FIRST ST., S.E.
NEW JERSEY AVE., S.E.
PROPERTY LINE
PROPOSED DEVELOPMENT
PROPERTY LINE
0
64
128
Feet
SCALE:
1/64" = 1'-0"
LEGEND
APNE APNE
AREA OF POTENTIAL NEW ENTRANCE
METRO STATION
DATE: APRIL 2015
SCALE:
1/64"=1'-0"
DRAWING TITLE.
STREET PLAN
SHEET NO.
1 OF 3


ENTRANCE TO EAST MEZZANINE
M STREET, S.E.
PROPERTY LINE
KNOCK-OUT PANEL BELOW
NEW JERSEY AVE., S.E.
FIRST ST., S.E.
PROPERTY LINE
PROPOSED DEVELOPMENT
PROPERTY LINE
FF..... FINISHED FLOOR
CONC. ..... CONCRETE
C&G ..... CURB AND GUTTER
BLDG. ..... BUILDING
STY. ..... STORY
TRV ..... ELECTRICAL TRANSFORMER
ASPH. ..... ASPHALT
ESMT. ..... EASEMENT
RCP ..... REINFORCED CONCRETE PIPE
CMP ..... CORRIGATED METAL PIPE
BRL ..... BUILDING RESTRICTION LINE
R/W ..... RIGHT-OF-WAY
0
64
128
Feet
SCALE:
1/64" = 1'-0"
LEGEND
CABLE TELEVISION CONDUIT
ELECTRICAL CONDUIT
EDGE OF PAVEMENT
NATURAL GAS CONDUIT
OVERHEAD WIRES
TELEPHONE/COMMUNICATIONS CONDUIT
PROPERTY LINES
PUBLIC UTILITIES EASEMENTS
SANITARY SEWER CONDUIT
STORM DRAIN CONDUIT
WATER CONDUIT
SANITARY CLEANOUT
STORM DRAIN MANHOLE
ELECTRICAL JUNCTION BOX
ELECTRICAL MANHOLE
FIRE DEPARTMENT CONNECTION
FIRE HYDRANT
GAS MANHOLE
GUY POLE
GAS VALVE
LIGHT POLE
PHONE PEDESTAL
PHONE MANHOLE
UTILITY POLE
SANITARY MANHOLE
TRAFFIC CONTROL BOX
TRAFFIC SIGNAL POLE
TREE
CABLE TELEVISION PEDESTAL
UNKNOWN UTILITY MANHOLE
WATER METER
WATER MANHOLE
WATER VALVE
BOLLARD
SIGN POST
WOOD POST
INLETS
CURB INLET
DATE: APRIL 2015
SCALE: 1/64"=1'-0"
DRAWING TITLE. EXISTING UTILITY PLAN
SHEET NO. 2 OF 3


M STREET.,S.E.
FIRST ST., S.E.
NEW JERSEY AVE., S.E.
S89°57'31"E
364.15'
PROPERTY LINE
KNOCK-OUT PANEL BELOW
PROPERTY LINE
S15°40'15"E
607.63'
PROPERTY LINE
N00°01'29"E
585.08'
PROPOSED DEVELOPMENT
EX. 36" ELECTRIC CONDUIT BANK
METRO VENT
0
32
64
Feet
SCALE: 1/32" = 1'-0"
DATE: APRIL 2015
SCALE: 1/32"=1'-0"
DRAWING TITLE. EXISTING UTILITY PLAN
SHEET NO. 3 OF 3

D.C BOUNDARY NOTE

BOUNDARY INFORMATION SHOWN HEREON WAS OBTAINED FROM A "PLAT OF BOUNDARY SURVEY", PREPARED BY A. MORTAN THOMAS ON AUGUST 18, 2005 AND VERIFIED IN THE FIELD INSOFAR AS POSSIBLE. PROPERTY LINE DIMENSIONS FROM OFFICIAL RECORDS MAY NOT NECESSARILY AGREE WITH ACTUAL MEASURED DIMENSIONS. ALL PROPERTY LINES IN THE DISTRICT OF COLUMBIA ARE SUBJECT TO CHANGE WITH THE FINAL DETERMINATION TO BE MADE BY THE OFFICE OF THE SURVEYOR. A "SURVEY TO MARK" PREPARED BY DISTRICT OF COLUMBIA REGISTERED LAND SURVEYOR AND VERIFIED BY THE OFFICE OF THE SURVEYOR MAY BE REQUIRED TO ESTABLISH A FINAL BOUNDARY DETERMINATION AND CONFIGURATION FOR THIS PROPERTY.

NOTES:

1.) THE SUBJECT PROPERTY IS IDENTIFIED AS TAX ASSESSMENT 0743 0854 (M AND 1ST STREET, S.E.)

2.) NO TITLE REPORT FURNISHED.

3.) THE HORIZONTAL DATUM IS BASED W.M.A.T.A. COORDINATE SYSTEM. THE VERTICAL DATUM IS BASED ON N.G.V.D. 29 (BM F-301R ELEV.=12.74')

4.) THE SUBJECT PROPERTY IS LOCATED IN ZONE "X" (AREA DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN) AS SHOWN ON FLOOD INSURANCE RATE MAP (FIRM) MAP NO. 1100010019C, FOR WASHINGTON, D.C. DATED SEPTEMBER 27, 2010, REVISED TO REFLECT LOMR, EFFECTIVE SEPTEMBER 28, 2010

5.) W.M.A.T.A. TUNNEL ALIGNMENT AND SUBSURFACE EASEMENT LOCATION ARE BASED ON AS-BUILT PLANS PROVIDED BY W.M.A.T.A., CONTRACT #M657, SECTION F3C. A FIELD RUN SURVEY OF THE TUNNEL LOCATIONS WAS NOT PERFORMED BY VIKA, INC.
F3C-R-1 RIGHT-OF-WAY PLAN
F3C-R-2 RIGHT-OF-WAY PLAN

UTILITY NOTE

THE UNDERGROUND UTILITY LOCATIONS SPECIFICALLY NOTED IN THE TABLE BELOW AND GRAPHICALLY SHOWN HEREON HAVE BEEN LOCATED FROM A COMBINATION OF FIELD SURVEY INFORMATION AND/OR EXISTING DRAWINGS. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE INDICATED FROM THE INFORMATION NOTED IN THE TABLE BELOW WHICH COMPRISES THE RECORD INFORMATION OBTAINED BY THE SURVEYOR. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES, UNLESS SPECIFICALLY NOTED ON THE DRAWING. THE FOLLOWING UTILITY COMPANIES HAVE BEEN SOLICITED FOR THEIR PLANS AND RECORD UTILITY DRAWINGS, LISTED BELOW ARE SPECIFIC PLAN/SHEET NUMBERS OF DRAWINGS PROVIDED BY THE UTILITY COMPANY OR LACK OF RESPONSE IS NOTED.

UTILITY COMPANY	PLAN # / SHEET #
VERIZON 3901 Calverton Boulevard - 3rd Floor Beltsville, Maryland 20705	NO REPLY AT THIS TIME
DISTRICT CABLE VISION 900 Michigan Avenue, NE Washington, DC 20017	NO REPLY AT THIS TIME
WASHINGTON GAS/MD REPLACEMENT SECTION 6801 Industrial Road Springfield, VA 22151	PLAN PROVIDED
MCI WORLDCOM 2250 Lakeside Road Richardson, TX 75082	MCI UTILITIES WITHIN OR NEAR "M" ST.& "4TH" ST. S.E. ROUGH SKETCH PROVIDED
PEPCO 1900 Pennsylvania Ave. Room 308 Washington, DC 20068	COMPOSITE COPY OF PLATS 7958F79, 799F379, 800F379, 798F378, 799F378, & 800F378
W.A.S.A.	WATER & SEWER PLANS / AS-BUILT DRAWINGS
AT&T 11026 Fingerboard Road Monrovia, MD 21770	NO FACILITIES IN THE PROJECT AREA

THE OWNER/DEVELOPER OF THE SUBJECT PROPERTY IS RESPONSIBLE FOR OBTAINING INFORMATION AND COORDINATING WITH ALL OTHER UTILITIES NOT LISTED IN THE TABLE ABOVE. THE OWNER/DEVELOPER IS ALSO RESPONSIBLE FOR CONTACTING "MISS UTILITY" 48 HOURS PRIOR TO CONSTRUCTION.

UTILITIES BASED ON CURRY DRAWINGS, ACCURATE INFISTRUCTURES INC. DATA FILES DATED 01/04/07 AND FIELD LOCATIONS.

DATE:	APRIL 2015
SCALE:	NOT TO SCALE
DRAWING TITLE.	EXISTING UTILITY INFO
SHEET NO.	1 OF 1

Appendix G: Detailed Capital Cost Estimates

PROJECT: **Navy Yard Station Access Improvements Estimate**

Date Prepared: **3/3/2016**

Project Phase: Preliminary Study

	Construction Total	30% Professional Services Cost	10% Unallocated Contingency	Total Project Cost	
East Entrance -Location 1 (Complete Entrance)	$ 25,300,000	$ 7,590,000	$ 3,289,000	$ 36,179,000	Includes 2 new escalators, 1 new stair, 2 elevators
East Entrance - Location 2 (Elevator Only)	$ 15,500,000	$ 4,650,000	$ 2,015,000	$ 22,165,000	Includes 3 elevators
Entrance Canopy	$ 1,800,000	$ 540,000	$ 234,000	$ 2,574,000	
East Mezzanine Extension Elevator Option 1A	$ 10,400,000	$ 3,120,000	$ 1,352,000	$ 14,872,000	Includes 1 new elevator, 1 new escalator & 1 new stair
East Mezzanine Extension Elevator Option 1B	$ 12,800,000	$ 3,840,000	$ 1,664,000	$ 18,304,000	Includes 1 new elevator, 1 reconfigured elevator, 1 new escalator & 1 new stair

Excavation Portion Only (generally includes utility relocation, SOE, excavation, dewatering, etc.)

	Construction Total	30% Professional Services Cost	10% Unallocated Contingency	Total Project Cost
East Entrance -Location 1 (Complete Entrance)	$ 10,700,000	$ 3,210,000	$ 1,391,000	$ 15,301,000
East Entrance - Location 2 (Elevator Only)	$ 6,700,000	$ 2,010,000	$ 871,000	$ 9,581,000

Professional Services

Project Development	7.00%
Engineering	7.00%
Project Management for Design and Construction	10.00%
Construction Administration & Management	2.00%
Professional Liability and other Non-Construction Insurance	1.00%
Legal; Permits; Review Fees by other agencies, cities, etc.	1.00%
Surveys, Testing, Investigation, Inspection	1.00%
Start up	1.00%
	30.00%

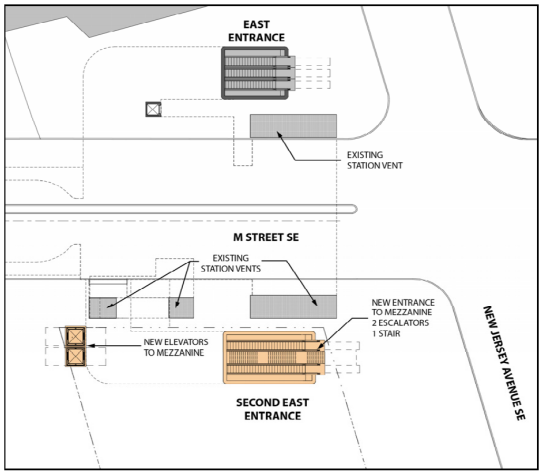
WMATA
Navy Yard Station Access Improvements Estimate
3/3/2016 by KS

Mark-up Factor					
Sales Tax	6%	50% taxable	3.00%	1.0300	multiplier
Subcontracting	5%	30% subcontracted	1.500%	1.04545	
Profit & Mark-up			25%	1.306813	

East Entrance -Location 1 (Complete Entrance)

Bid Item	Section No.	Description	Quantity	Unit	Unit Price	Extension
1		Mobilization	1	Allowance	$ 672,000.00	$ 672,000
2		Miscellaneous Work Allowance	0	Allowance	10%	$ -
3		Quality Assurance and Quality Control	1	Allowance	3%	$ 427,918
4		Trackside Safety Fence	0	LF	$ 53.00	$ -
5		Orange Construction Fence	1000	LF	$ 7.71	$ 7,710
6		Engineer's Field Office	1	Allowance	$ 36,000.00	$ 36,000
7		Temporary Ped Traffic to Stairs/Escalator & MPT	0	LS	$ 600,000.00	$ -
8		Security	1	LS	$ 864,000	$ 864,000
9		Utility Relocation	1	Allowance	$ 500,000	$ 500,000
10		Dewatering	1	LS	$ 1,200,000	$ 1,200,000
11		SOE for New Stairs	8249	SF	$ 100.00	$ 824,890
12		Excavation	11960	CY	$ 90.00	$ 1,076,413
13		Waterproofing	14285	SF	$ 20.00	$ 285,698
14		Concrete Slab & Walls	969	CY	$ 1,200.00	$ 1,163,200
15		Public Stairs	40.33	VF	$ 2,500.00	$ 100,825
16		Escalators	2	EA	$ 1,500,000	$ 3,000,000
17		Canopy	1480	SF	$ 120.00	$ 177,600
18		Electrical	1	LS	$ 800,000	$ 800,000
19		New Signage	1	LS	$ 250,000	$ 250,000
20		Demolition of Existing Access Wall	1	LS	$ 50,000	$ 50,000
21		Backfill	8467	CY	$ 60.00	$ 508,002
22		New Mezzanine Finishes	0	LS	$ 300,000	$ -
23		Emergency Egress Stair - New Location SOE	0	SF	$ 100.00	$ -
24		Excavation	0	CY	$ 90.00	$ -
25		Sidewalk	9000	SF	$ 12.00	$ 108,000
26		Concrete Slab & Walls	0	CY	$ 1,200.00	$ -
27		Stairs	0	VF	$ 1,200.00	$ -
28		Entrance/Exit Enclosure	2256	SF	$ 100	$ 225,600
29		Electrical	1	LS	$ 100,000.00	$ 100,000
30		New Elevators	2	EA	$ 800,000.00	$ 1,600,000
31		Plumbing	1	LS	$ 250,000.00	$ 250,000
32		HVAC	1	LS	$ 500,000.00	$ 500,000
33		New Entrance Finishes	1275	SF	$ 100.00	$ 127,500
34		Elevator Machinery Room	120	SF	$ 60.00	$ 7,200
35		Escalator Machinery Room	105	SF	$ 60.00	$ 6,300
36						$ -
37						$ -
		Subtotal				$ 14,868,856
		Contractor & Taxes Factor	30.68%			$ 4,561,951
		Allocated Contingecny	30.00%			$ 5,829,242
		Engineer's Estimate				**$ 25,260,050**

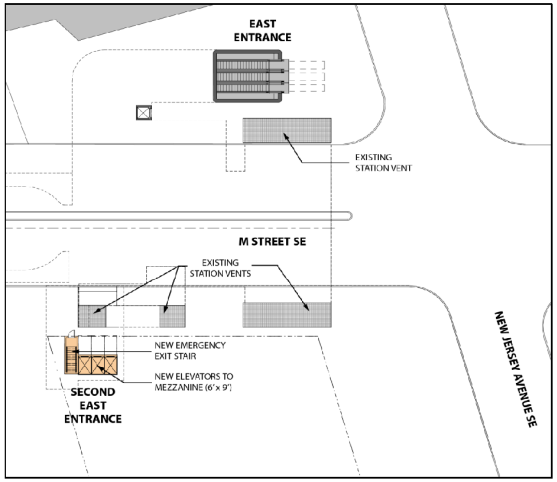
$ 28,000 24 months



East Entrance - Location 2 (Elevator Only)

Bid Item	Section No.	Description	Quantity	Unit	Unit Price	Extension
1		Mobilization	1	LS	$ 560,000.00	$ 560,000
2		Miscellaneous Work Allowance	0	Allowance	10%	$ -
3		Quality Assurance and Quality Control	1	Allowance	3%	$ 263,101
4		Trackside Safety Fence	0	LF	$ 53.00	$ -
5		Orange Construction Fence	800	LF	$ 7.71	$ 6,168
6		Engineer's Field Office	1	Allowance	$ 9,000.00	$ 9,000
7		Temporary Ped Traffic to Stairs/Escalator/Elevator & MPT	0	LS	$ 600,000.00	$ -
8		Security	1	LS	$ 720,000	$ 720,000
9		Utility Relocation	1	Allowance	$ 500,000	$ 500,000
10		Dewatering	1	LS	$ 900,000	$ 900,000
11		SOE for New Elevators	5162	SF	$ 100	$ 516,224
12		Excavation	4124	CY	$ 90	$ 371,193
13		Waterproofing	8474.24	SF	$ 20	$ 169,485
14		Concrete Slab & Walls	689	CY	$ 1,200.00	$ 826,866
15		Public Stairs	0	VF	$ 2,500	$ -
16		Escalators	0	EA	$ 1,500,000	$ -
17		Canopy	162	SF	$ 120.00	$ 19,440
18		Electrical	1	LS	$ 600,000.00	$ 600,000
19		New Signage	1	LS	$ 220,000.00	$ 220,000
20		Demolition of Existing Access Wall	1	LS	$ 50,000.00	$ 50,000
21		Backfill	1497	CY	$ 60.00	$ 89,848
22		New Mezzanine Finishes	0	LS	$ 300,000.00	$ -
23		Emergency Egress Stair - New Location SOE	0	SF	$ 100.00	$ -
24		Excavation	0	CY	$ 90.00	$ -
25		Sidewalk	4800	SF	$ 12.00	$ 57,600
26		Concrete Slab & Walls	0	CY	$ 1,200.00	$ -
27		Stairs - Emergency	40.33	VF	$ 1,200.00	$ 48,396
28		Entrance/Exit Enclosure	648	SF	$ 100.00	$ 64,800
29		Electrical	1	LS	$ 100,000.00	$ 100,000
30		New Elevators	3	EA	$ 800,000.00	$ 2,400,000
31		Plumbing	1	LS	$ 250,000.00	$ 250,000
32		HVAC	1	LS	$ 300,000.00	$ 300,000
33		New Entrance Finishes	612	SF	$ 100.00	$ 61,200
34		Elevator Machinery Room	150	SF	$ 60.00	$ 9,000
35		Escalator Machinery Room	0	SF	$ 60.00	$ -
36						$ -
37						$ -
		Subtotal				$ 9,112,320
		Contractor & Taxes Factor	30.68%			$ 2,795,774
		Allocated Contingecny	30.00%			$ 3,572,428
		Engineer's Estimate				**$ 15,480,522**

$ 28,000 20 months



Entrance Canopy

Assuming the canopies to be a stand alone contract

$	15,000	6 months				

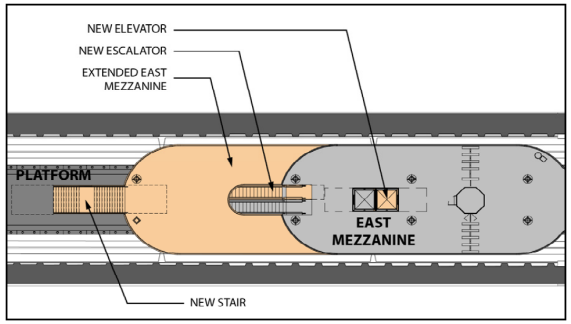
Bid Item	Section No.	Description	Quantity	Unit	Unit Price	Extension
1		Mobilization	1	LS	$ 90,000.00	$ 90,000
2		Miscellaneous Work Allowance	0	Allowance	10%	$ -
3		Quality Assurance and Quality Control	1	Allowance	3%	$ 34,689
4		Trackside Safety Fence	0	LF	$ 53.00	$ -
5		Orange Construction Fence	400	LF	$ 7.71	$ 3,084
6		Engineer's Field Office	1	Allowance	$ 9,000.00	$ 9,000
7		Temporary Ped Traffic to Stairs/Escalator/Elevator & MPT	0	LS	$ 600,000.00	$ -
8		Security	1	LS	$ 216,000	$ 216,000
9		Utility Relocation	1	Allowance	$ 100,000	$ 100,000
10		Dewatering	0	LS	$ 300,000	$ -
11		SOE for New Elevators	0	SF	$ 100	$ -
12		Excavation	300	CY	$ 90	$ 27,000
13		Waterproofing	0	SF	$ 20	$ -
14		Concrete Slab & Walls	50	CY	$ 1,200.00	$ 60,000
15		Public Stairs	0	VF	$ 2,500	$ -
16		Escalators	0	EA	$ 1,500,000	$ -
17		Canopy	1480	SF	$ 120.00	$ 177,600
18		Electrical	1	LS	$ 74,000.00	$ 74,000
19		New Signage	1	LS	$ 80,000.00	$ 80,000
20		Demolition of Existing Access Wall	0	LS	$ 50,000.00	$ -
21		Backfill	0	CY	$ 60.00	$ -
22		New Mezzanine Finishes	0	LS	$ 300,000.00	$ -
23		Emergency Egress Stair - New Location SOE	0	SF	$ 100.00	$ -
24		Excavation	0	CY	$ 90.00	$ -
25		Sidewalk	1500	SF	$ 12.00	$ 18,000
26		Concrete Slab & Walls	0	CY	$ 1,200.00	$ -
27		Stairs	0	VF	$ 1,200.00	$ -
28		Entrance/Exit Enclosure	2256	SF	$ 100.00	$ 225,600
29		Electrical	1	LS	$ 25,000.00	$ 25,000
30		New Elevators	0	EA	$ 800,000.00	$ -
31		Plumbing	1	LS	$ 40,000.00	$ 40,000
32		HVAC	1	LS	$ 20,000.00	$ 20,000
33		New Entrance Finishes	0	SF	$ 100.00	$ -
34		Elevator Machinery Room	0	SF	$ 60.00	$ -
35		Escalator Machinery Room	0	SF	$ 60.00	$ -
36						$ -
37						$ -
38						$ -
		Subtotal				$ 1,199,973
		Contractor & Taxes Factor	30.68%			$ 368,167
		Allocated Contingecny	15.00%			$ 235,221
		Engineer's Estimate				**$ 1,803,360**

East Mezzanine Extension Elevator Option 1A

Bid Item	Section No.	Description	Quantity	Unit	Unit Price	Extension
1		Mobilization	1	LS	$ 560,000.00	$ 560,000
2		Miscellaneous Work Allowance	0	Allowance	10%	$ -
3		Quality Assurance and Quality Control	1	Allowance	3%	$ 181,916
4		Trackside Safety Fence	300	LF	$ 53.00	$ 15,900
5		Orange Construction Fence	1000	LF	$ 7.71	$ 7,710
6		Engineer's Field Office	1	Allowance	$ 30,000	$ 30,000
7		Temporary Ped Traffic to Stairs/Escalator/Elevator & MPT	1	LS	$ 600,000	$ 600,000
8		Security	1	LS	$ 720,000	$ 720,000
9		Utility Relocation	1	Allowance	$ 300,000	$ 300,000
10		Dewatering	0	LS	$ 900,000	$ -
11		SOE for New Elevators	0	SF	$ 100	$ -
12		Excavation	0	CY	$ 90	$ -
13		Waterproofing	0	SF	$ 20	$ -
14		Concrete Slab & Walls	166	CY	$ 1,200.00	$ 199,111
15		Public Stairs	15	VF	$ 3,750	$ 56,250
16		Escalators	1	EA	$ 1,500,000	$ 1,500,000
17		Canopy	0	SF	$ 120.00	$ -
18		Electrical	1	LS	$ 300,000.00	$ 300,000
19		New Signage	1	LS	$ 250,000.00	$ 250,000
20		Demolition of Existing Stairs & Mezzanine	1	LS	$ 50,000.00	$ 50,000
21		Backfill	0	CY	$ 60.00	$ -
22		New Mezzanine Finishes	2240	SF	$ 120.00	$ 268,800
23		Emergency Egress Stair - New Location SOE	0	SF	$ 100.00	$ -
24		Excavation	0	CY	$ 90.00	$ -
25		Sidewalk	0	SF	$ 12.00	$ -
26		Concrete Slab & Walls	0	CY	$ 1,200.00	$ -
27		Stairs	0	VF	$ 1,200.00	$ -
28		Elevator Enclosure	1161	SF	$ 100.00	$ 116,100
29		Electrical	1	LS	$ 100,000.00	$ 100,000
30		New Elevators	1	EA	$ 800,000.00	$ 800,000
31		Plumbing	1	LS	$ 100,000.00	$ 100,000
32		HVAC	1	LS	$ 100,000.00	$ 100,000
33		New Entrance Finishes	200	SF	$ 100.00	$ 20,000
34		Elevator Machinery Room	150	SF	$ 60.00	$ 9,000
35		Escalator Machinery Room	105	SF	$ 60.00	$ 6,300
36		Ballistrades	180	LF	$ 400.00	$ 72,000
37						$ -
38						$ -
		Subtotal				$ 6,363,087
		Contractor & Taxes Factor	30.68%			$ 1,952,275
		Allocated Contingecny	25.00%			$ 2,078,840
		Engineer's Estimate				**$ 10,394,202**

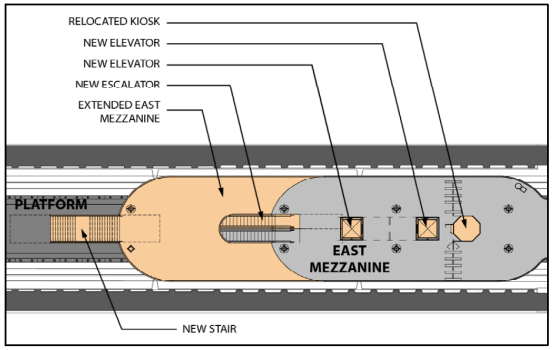
Existing electrical revisions

$ 28,000 20 months



East Mezzanine Extension Elevator Option 1B						
Bid Item		Description	Quantity	Unit	Unit Price	Extension
1		Mobilization	1	LS	$ 616,000.00	$ 616,000
2		Miscellaneous Work Allowance	0	Allowance	10%	$ -
3		Quality Assurance and Quality Control	1	LS	3%	$ 191,701
4		Trackside Safety Fence	300	LF	$ 53.00	$ 15,900
5		Orange Construction Fence	1000	LF	$ 7.71	$ 7,710
6		Engineer's Field Office	1	Allowance	$ 33,000	$ 33,000
7		Temporary Ped Traffic to Stairs/Escalator & MPT	1	LS	$ 660,000	$ 660,000
8		Security	1	LS	$ 792,000	$ 792,000
9		Utility Relocation	1	Allowance	$ 300,000	$ 300,000
10		Dewatering	0	LS	$ 1,050,000	$ -
11		SOE for New Stairs	0	SF	$ 100.00	$ -
12		Excavation	0	CY	$ 90.00	$ -
13		Waterproofing	0	SF	$ 20.00	$ -
14		Concrete Slab & Walls	166	CY	$ 1,200.00	$ 199,111
15		Public Stairs	15	VF	$ 2,500.00	$ 37,500
16		Escalators	1	EA	$ 1,500,000	$ 1,500,000
17		Canopy	0	SF	$ 120.00	$ -
18		Electrical	1	LS	$ 350,000.00	$ 350,000
19		New Signage	1	LS	$ 250,000.00	$ 250,000
20		Demolition of Existing Mezzanine & Kiosk Relocation	1	LS	$ 75,000.00	$ 75,000
21		Backfill	0	CY	$ 60.00	$ -
22		New Mezzanine Finishes	2240	SF	$ 120.00	$ 268,800
23		Emergency Egress Stair - New Location SOE	0	SF	$ 100.00	$ -
24		Excavation	0	CY	$ 90.00	$ -
25		Sidewalk	0	SF	$ 12.00	$ -
26		Concrete Slab & Walls	0	CY	$ 1,200.00	$ -
27		Stairs	0	VF	$ 1,200.00	$ -
28		Elevator Enclosure	1080	SF	$ 100.00	$ 108,000
29		Electrical	1	LS	$ 130,000.00	$ 130,000
30		New Elevators	1	EA	$ 800,000.00	$ 800,000
31		Plumbing	1	LS	$ 140,000.00	$ 140,000
32		HVAC	1	LS	$ 140,000.00	$ 140,000
33		New Entrance Finishes	200	SF	$ 100.00	$ 20,000
34		Elevator Machinery Room	150	SF	$ 60.00	$ 9,000
35		Escalator Machinery Room	105	SF	$ 60.00	$ 6,300
36		Ballistrades	180	LF	$ 400.00	$ 72,000
37		New Elevator	1	LS	$ 800,000.00	$ 800,000
38						$ -
		Subtotal				$ 7,522,022
		Contractor & Taxes Factor	30.68%			$ 2,307,850
		Allocated Contingecny	30.00%			$ 2,948,962
		Engineer's Estimate				**$ 12,778,834**

$ 28,000 22 months



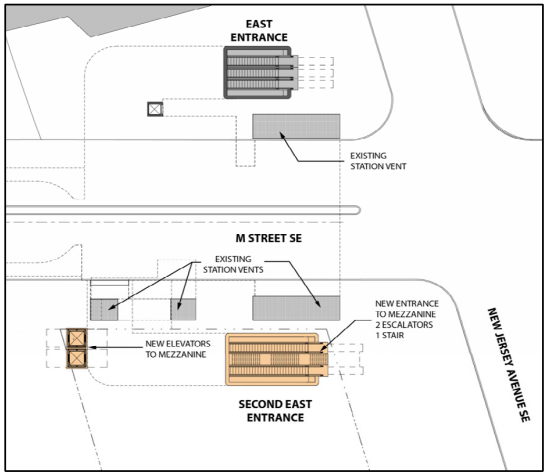
WMATA
Navy Yard Station Access Improvements Estimate
Detailed Excavation Costs
3/3/2016 by KS

Mark-up Factor					
Sales Tax	6%	50% taxable	3.00%	1.0300	multiplier
Subcontracting	5%	30% subcontracted	1.500%	1.04545	
Profit & Mark-up			25%	1.306813	

East Entrance -Location 1 (Complete Entrance)

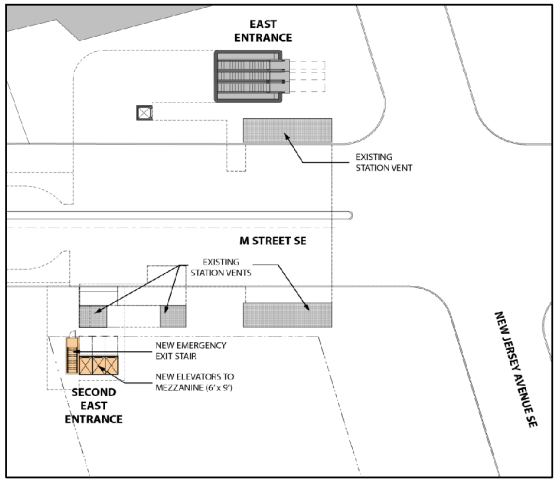
Bid Item	Section No.	Description	Quantity	Unit	Unit Price	Extension
1		Mobilization	1	Allowance	$ 221,760.00	$ 221,760
2		Miscellaneous Work Allowance	0	Allowance	10%	$ -
3		Quality Assurance and Quality Control	1	Allowance	3%	$ 183,684
4		Trackside Safety Fence	0	LF	$ 53.00	$ -
5		Orange Construction Fence	1000	LF	$ 7.71	$ 7,710
6		Engineer's Field Office	1	Allowance	$ 11,880.00	$ 11,880
7		Temporary Ped Traffic to Stairs/Escalator & MPT	0	LS	$ 600,000.00	$ -
8		Security	1	LS	$ 285,120	$ 285,120
9		Utility Relocation	1	Allowance	$ 500,000	$ 500,000
10		Dewatering	1	LS	$ 1,200,000	$ 1,200,000
11		SOE for New Stairs	8249	SF	$ 100.00	$ 824,890
12		Excavation	11960	CY	$ 90.00	$ 1,076,413
13		Waterproofing	14285	SF	$ 20.00	$ 285,698
14		Concrete Slab & Walls	969	CY	$ 1,200.00	$ 1,163,200
15		Public Stairs	0	VF	$ 2,500.00	$ -
16		Escalators	0	EA	$ 1,500,000	$ -
17		Canopy	0	SF	$ 120.00	$ -
18		Electrical	0	LS	$ 800,000	$ -
19		New Signage	0	LS	$ 250,000	$ -
20		Demolition of Existing Access Wall	1	LS	$ 50,000.00	$ 50,000
21		Backfill	8467	CY	$ 60.00	$ 508,002
22		New Mezzanine Finishes	0	LS	$ 300,000	$ -
23		Emergency Egress Stair - New Location SOE	0	SF	$ 100.00	$ -
24		Excavation	0	CY	$ 90.00	$ -
25		Sidewalk	0	SF	$ 12.00	$ -
26		Concrete Slab & Walls	0	CY	$ 1,200.00	$ -
27		Stairs	0	VF	$ 1,200.00	$ -
28		Entrance/Exit Enclosure	0	SF	$ 100	$ -
29		Electrical	0	LS	$ 100,000.00	$ -
30		New Elevators	0	EA	$ 800,000.00	$ -
31		Plumbing	0	LS	$ 250,000.00	$ -
32		HVAC	0	LS	$ 500,000.00	$ -
33		New Entrance Finishes	0	SF	$ 100.00	$ -
34		Elevator Machinery Room	0	SF	$ 60.00	$ -
35		Escalator Machinery Room	0	SF	$ 60.00	$ -
36						$ -
37						$ -
		Subtotal				$ 6,318,357
		Contractor & Taxes Factor	30.68%			$ 1,938,551
		Allocated Contingecny	30.00%			$ 2,477,072
		Engineer's Estimate				**$ 10,733,980**

$ 28,000 24 months
For Excavation, assume 33% of costs



East Entrance - Location 2 (Elevator Only)

Bid Item	Section No.	Description	Quantity	Unit	Unit Price	Extension
1		Mobilization	1	LS	$ 184,800.00	$ 184,800
2		Miscellaneous Work Allowance	0	Allowance	10%	$ -
3		Quality Assurance and Quality Control	1	Allowance	3%	$ 115,566
4		Trackside Safety Fence	0	LF	$ 53.00	$ -
5		Orange Construction Fence	800	LF	$ 7.71	$ 6,168
6		Engineer's Field Office	1	Allowance	$ 2,970.00	$ 2,970
7		Temporary Ped Traffic to Stairs/Escalator/Elevator & MPT	0	LS	$ 600,000.00	$ -
8		Security	1	LS	$ 237,600	$ 237,600
9		Utility Relocation	1	Allowance	$ 500,000	$ 500,000
10		Dewatering	1	LS	$ 900,000	$ 900,000
11		SOE for New Elevators	5162	SF	$ 100.00	$ 516,224
12		Excavation	4124	CY	$ 90.00	$ 371,193
13		Waterproofing	8474	SF	$ 20.00	$ 169,485
14		Concrete Slab & Walls	689	CY	$ 1,200.00	$ 826,866
15		Public Stairs	0	VF	$ 2,500	$ -
16		Escalators	0	EA	$ 1,500,000	$ -
17		Canopy	0	SF	$ 120.00	$ -
18		Electrical	0	LS	$ 600,000.00	$ -
19		New Signage	0	LS	$ 220,000.00	$ -
20		Demolition of Existing Access Wall	1	LS	$ 50,000.00	$ 50,000
21		Backfill	1497	CY	$ 60.00	$ 89,848
22		New Mezzanine Finishes	0	LS	$ 300,000	$ -
23		Emergency Egress Stair - New Location SOE	0	SF	$ 100.00	$ -
24		Excavation	0	CY	$ 90.00	$ -
25		Sidewalk	0	SF	$ 12.00	$ -
26		Concrete Slab & Walls	0	CY	$ 1,200.00	$ -
27		Stairs - Emergency	0	VF	$ 1,200.00	$ -
28		Entrance/Exit Enclosure	0	SF	$ 100.00	$ -
29		Electrical	0	LS	$ 100,000.00	$ -
30		New Elevators	0	EA	$ 800,000.00	$ -
31		Plumbing	0	LS	$ 250,000.00	$ -
32		HVAC	0	LS	$ 300,000.00	$ -
33		New Entrance Finishes	0	SF	$ 100.00	$ -
34		Elevator Machinery Room	0	SF	$ 60.00	$ -
35		Escalator Machinery Room	0	SF	$ 60.00	$ -
36						$ -
37						$ -
		Subtotal				$ 3,970,719
		Contractor & Taxes Factor	30.68%			$ 1,218,266
		Allocated Contingecny	30.00%			$ 1,556,696
		Engineer's Estimate				**$ 6,745,681**

$ 28,000 20 months

For Excavation, assume 33% of costs